48/50HG014-028
Single Package Large Rooftop Units with *Comfort*Link™ Controls

Controls Operation and Troubleshooting

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SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment. Untrained personnel can perform the basic maintenance functions of replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply. Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguishers available for all brazing operations.

GENERAL

This publication contains Start-Up, Controls, Operation, and Troubleshooting information for the 48/50HG rooftop units. See Table 1. These units are equipped with *Comfort*Link controls.

Table 1 — Unit Sizes (48/50HG)

UNIT MODEL	NOMINAL TONS
48/50HG014	12 1/2
48/50HG016	15
48/50HG020	18
48/50HG024	20
48/50HG028	25

MAJOR SYSTEM COMPONENTS

General — The 48/50HG single package rooftop units with electric cooling and with gas heating (48HG units) or electric cooling and electric heating (50HG Units) contain the *Comfort*Link electronic control system that monitors all operations of the rooftop. The control system is composed of several components as listed in sections below. See Fig. 1-3 for the control and power schematics. Figure 4 shows the layout of the control box, unit, and thermistor and transducer locations.

Main Base Board (MBB) — See Fig. 5. The MBB is the center of the *Comfort*Link control system. It contains the major portion of the operating software and controls the operation of the unit. The MBB continuously monitors input/output channel information received from its inputs and from the Economizer Control Board (ECB). The MBB receives inputs from thermistors T1 through T5 and transducers T6 through T8. See Table 2. The MBB also receives the Current Sensor inputs for compressors A1, B1 and C1 and other discrete or digital inputs. See Table 3. The MBB reads space temperature

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(SPT) from either a T55 or T56 device and space temperature offset (SPTO) from a T56 device. See Table 4 and Field-Installed Accessories section below. The MBB controls 11 relays. See Table 5.

Economizer Control Board (ECB) — The ECB controls the economizer actuator. See Fig. 6. Relay 6 on the ECB supplies 24 VAC to the actuator. The control signal from the ECB uses the Belimo communication protocol. The ECB has inputs for Indoor Air Quality (IAQ), Outdoor Air Quality (OAQ), and enthalpy. See Table 4. It also controls two power exhaust motors (PE1 and PE2).

Scrolling Marquee Display — This device is the keypad interface used to access rooftop information, read sensor values, and test the unit. See Fig. 7. The marquee display is a 4-key, 4-character, 16-segment LED (light-emitting diode) display. Eleven mode LEDs are located on the display as well as an Alarm Status LED. See Marquee Display Usage section on page 11 for further details.

Board Addresses — The Main Base Board (MBB) has a 3-position instance jumper that is set at the factory to "1." Do not change this setting. The ECB has a 4-position DIP switch. Each DIP switch is set to "0" at the factory. Do not change this setting.

Control Module Communication

RED LED — Proper operation of the control boards can be visually checked by looking at the red status LEDs. When operating correctly, the red status LEDs should blink in unison at a rate of once every 2 seconds. If the red LEDs are not blinking in unison, verify that correct power is being supplied to all modules. Also, be sure that the Main Base Board is supplied with the current software. If necessary, reload current software. If the problem still persists, replace the MBB. A board LED that is lit continuously or blinking at a rate of once per second or faster indicates that the board should be replaced.

GREEN LED — The MBB has one green LED. The Local Equipment Network (LEN) LED should always be blinking whenever power is on. All other boards have a LEN LED that will blink whenever power is on. If LEN LED is not blinking, check LEN connections for potential communication errors (J3 and J4 connectors). Communication between modules is accomplished by a 3-wire sensor bus. These 3 wires run in parallel from module to module. The J4 connector on the MBB provides both power and communication directly to the marquee display.

YELLOW LED — The MBB has one yellow LED. The Carrier Comfort Network (CCN) LED will blink during times of network communication.

Carrier Comfort Network Interface — The 48/50HG units can be connected to the CCN if desired. The communication bus wiring is a shielded, 3-conductor cable with drain wire and is field supplied and installed. See Table 6. The system elements are connected to the communication bus in a daisy chain arrangement. The positive pin of each system element communication connector must be wired to the positive pins of the system elements on either side of it. This is also required for the negative and signal ground pins of each system element. Wiring connections for CCN should be made at TB2. See Fig. 1 and 2. Consult the CCN Contractor's Manual for further information.

NOTE: Conductors and drain wire must be 20-AWG (American Wire Gage) minimum stranded, tinned copper. Individual conductors must be insulated with PVC, PVC/nylon, vinyl, Teflon, or polyethylene. An aluminum/polyester 100% foil shield and an outer jacket of PVC, PVC/nylon, chrome vinyl, or Teflon with a minimum operating temperature range of –20 C to 60 C is required. Wire manufactured by Alpha (2413 or 5463), American (A22503), Belden (8772), or Columbia (02525) meets the above mentioned requirements.

It is important when connecting to a CCN communication bus that a color-coding scheme be used for the entire network to simplify the installation. It is recommended that red be used for the signal positive, black for the signal negative and white for the signal ground. Use a similar scheme for cables containing different colored wires.

At each system element, the shields of its communication bus cables must be tied together. If the communication bus is entirely within one building, the resulting continuous shield must be connected to a ground at one point only. If the communication bus cable exits from one building and enters another, the shields must be connected to grounds at the lightning suppressor in each building where the cable enters or exits the building (one point per building only). To connect the unit to the network:

1. Turn off power to the control box.
2. Cut the CCN wire and strip the ends of the red (+), white (ground), and black (–) conductors. (Substitute appropriate colors for different colored cables.)
3. Connect the red wire to (+) terminal on TB2 of the plug, the white wire to COM terminal, and the black wire to the (–) terminal.
4. The RJ14 CCN connector on TB2 can also be used, but is only intended for temporary connection (for example, a laptop computer running Service Tool).

IMPORTANT: A shorted CCN bus cable will prevent some routines from running and may prevent the unit from starting. If abnormal conditions occur, unplug the connector. If conditions return to normal, check the CCN connector and cable. Run new cable if necessary. A short in one section of the bus can cause problems with all system elements on the bus.

Field-Installed Accessories

SPACE TEMPERATURE SENSOR (T55) — The T55 Space Temperature Sensor (Part No. CEC0121448-01) is a field-installed accessory. The sensor is installed on a building interior wall to measure room air temperature. The T55 sensor also includes an override button on the front cover to permit occupants to override the Unoccupied Schedule (if programmed). The jumper wire in the installer's packet must be connected between R and W1 when using a T55 device. See Fig. 8-10.

SPACE TEMPERATURE SENSOR (T56) — The T56 Space Temperature Sensor (Part No. CEC0121503-01) is a field-installed accessory. This sensor includes a sliding scale on the front cover that permits an occupant to adjust the space temperature set point remotely. The jumper wire in the installer's packet must be connected between R and W1 when using a T56 device. See Fig. 8, 9, and 11.

ECONOMIZER — The economizer accessory (Part No. CRECOMZR009A00) is a field-installed accessory. When installing this accessory, the unit must be configured for economizer installation by setting EC.EQ to YES. The default settings for the other economizer configurations should be satisfactory. If they need to be changed, additional information about these configuration settings can be found in the Economizer section.

POWER EXHAUST — The power exhaust accessories (Part No. CRPWREXH018A00, CRPWREXH019A00, CRPWREXH020A00) are field-installed accessories for power exhaust for different voltages. When installing this accessory, the unit must be configured for power exhaust installation by setting PE.EN to YES. The default settings for the other power exhaust configurations should be satisfactory. If they need to be changed, additional information about these configurations can be found in the Power Exhaust section.

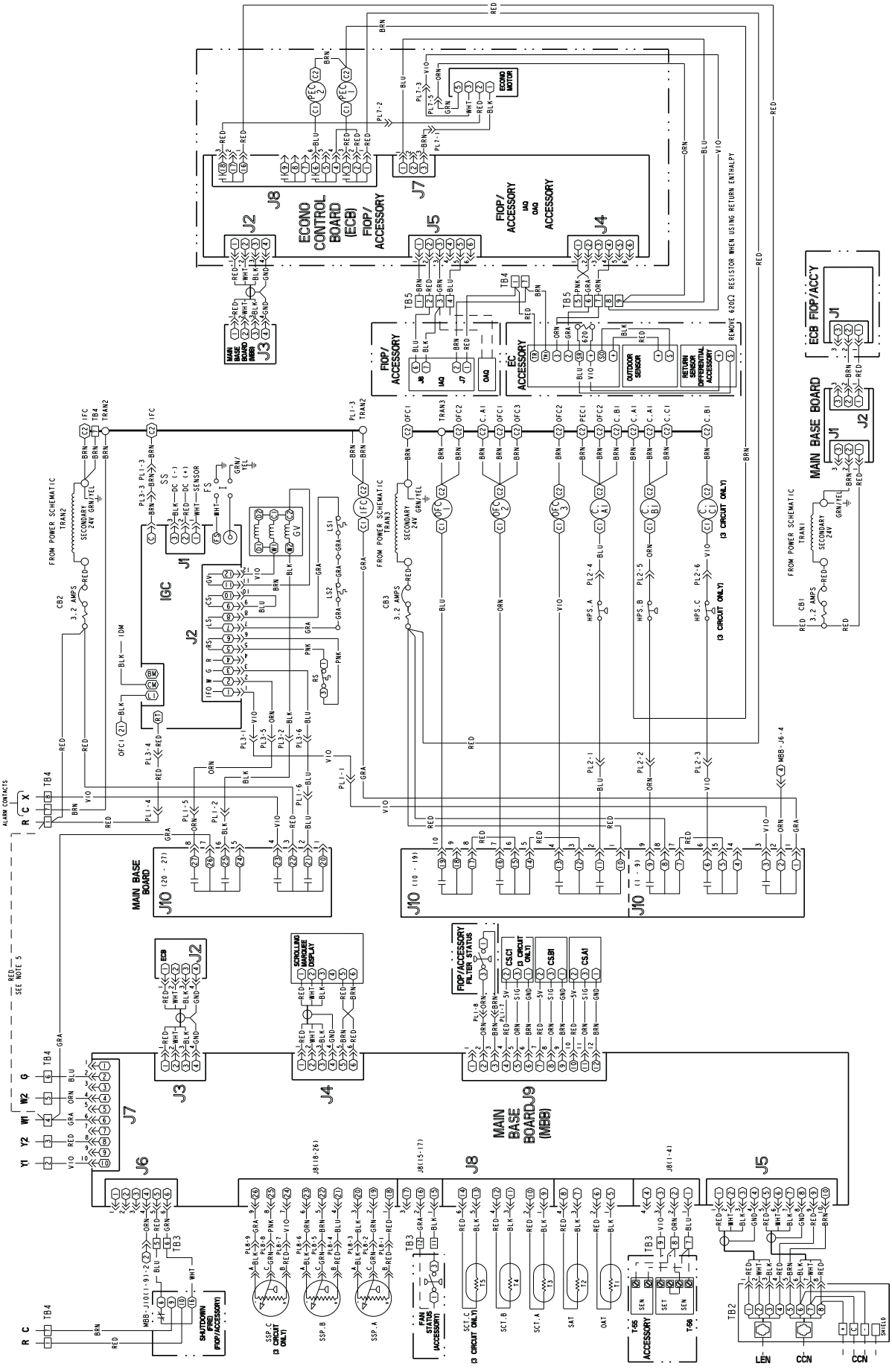


Fig. 1 — Low Voltage Control Schematic — 48HG Units

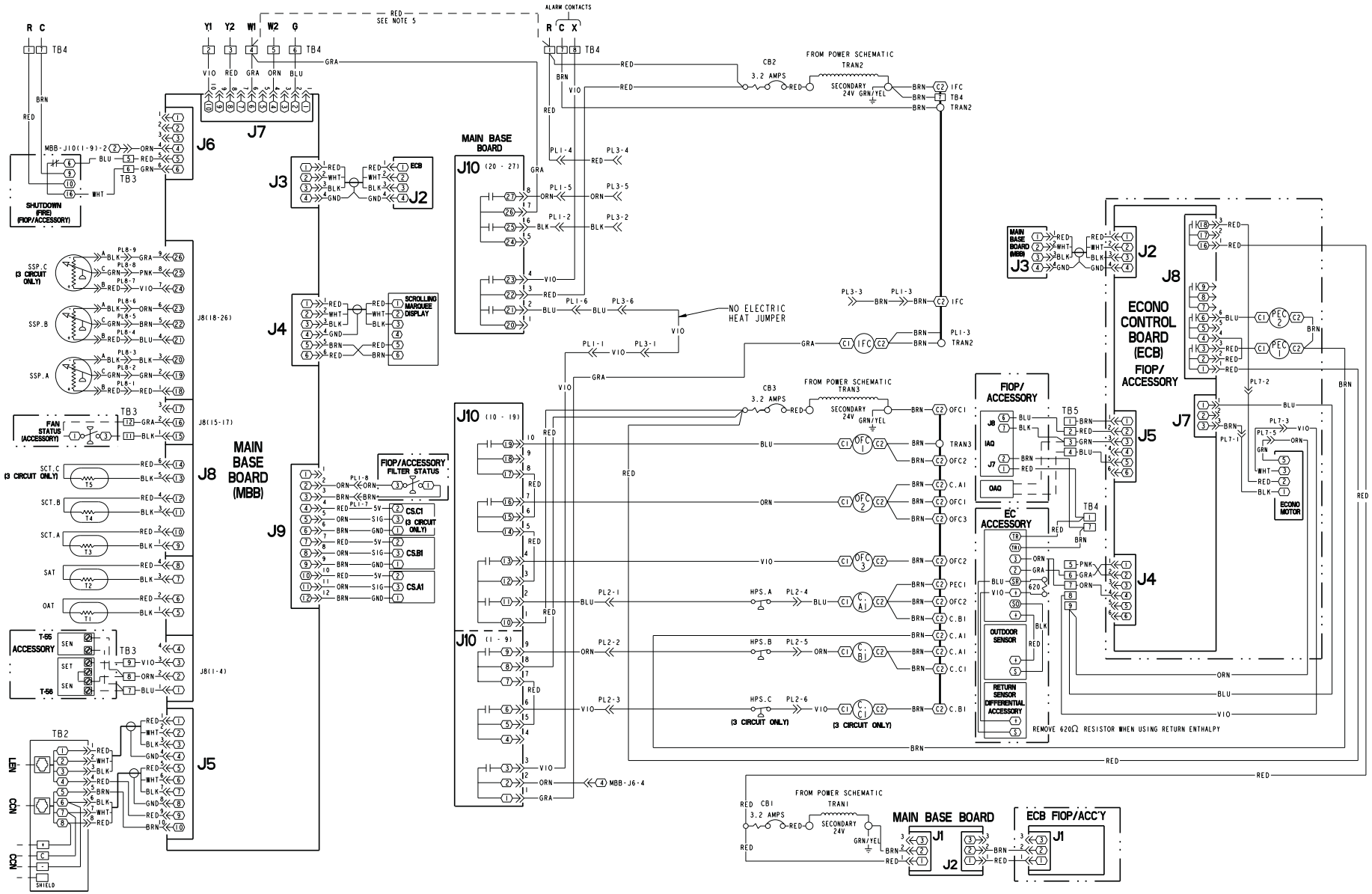


Fig. 2 — Low Voltage Control Schematic — 50HG Units

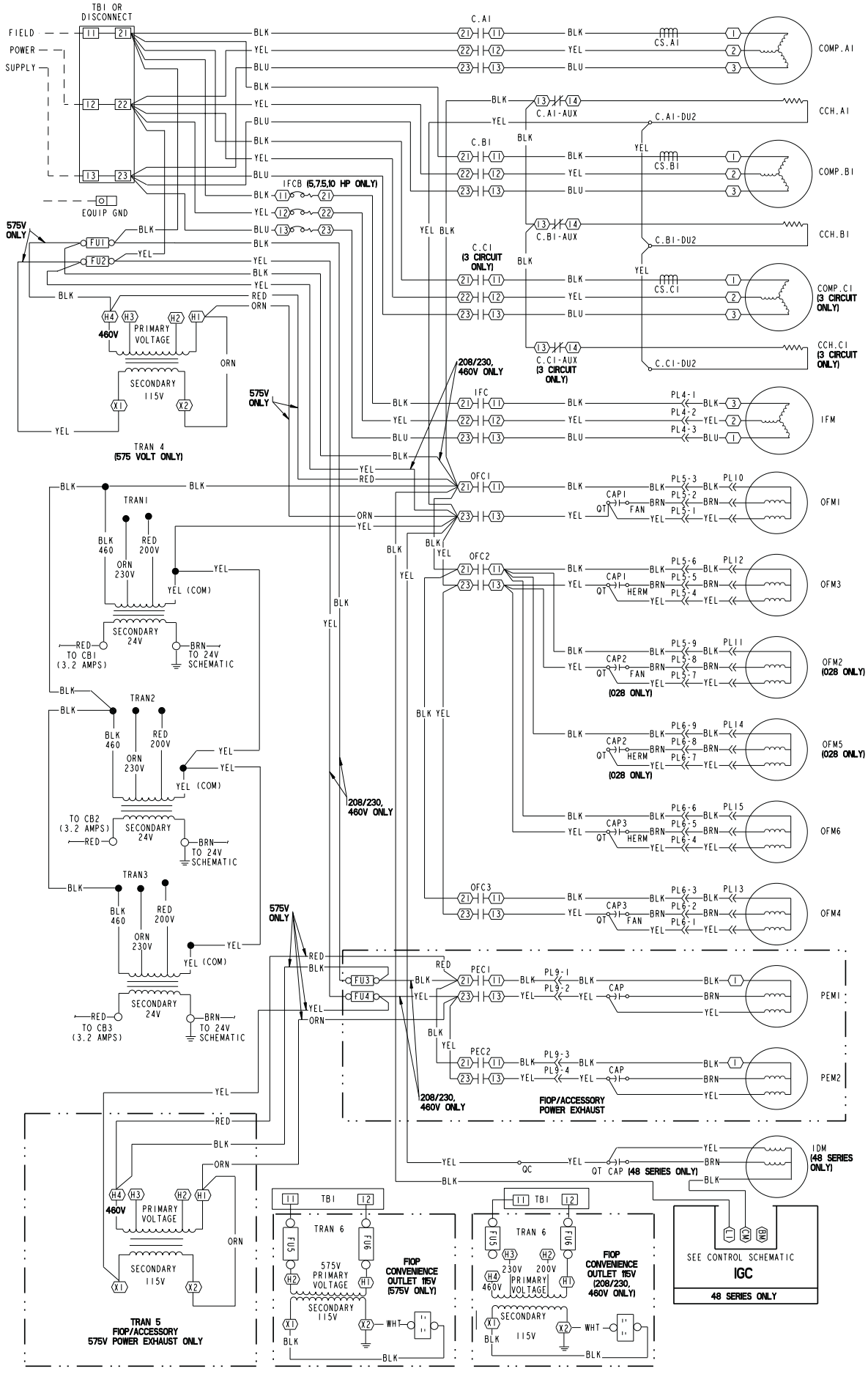
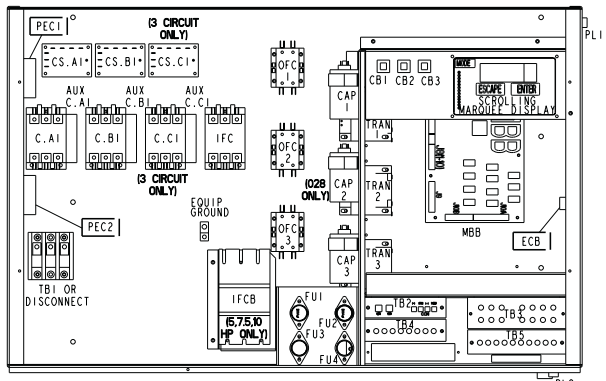
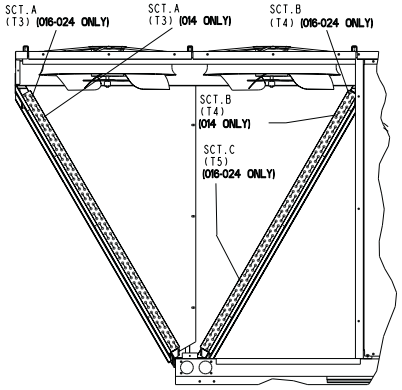


Fig. 3 — Power Schematic — 48/50HG

COMPONENT ARRANGEMENT



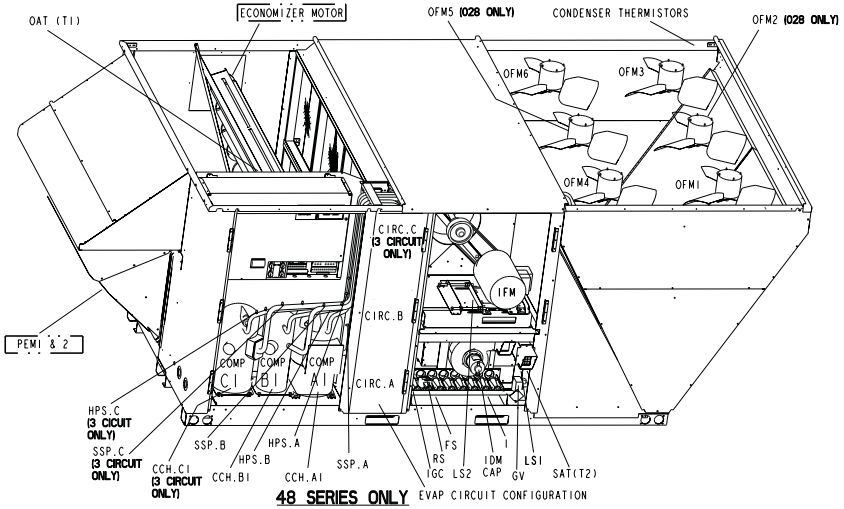
CONTROL BOX



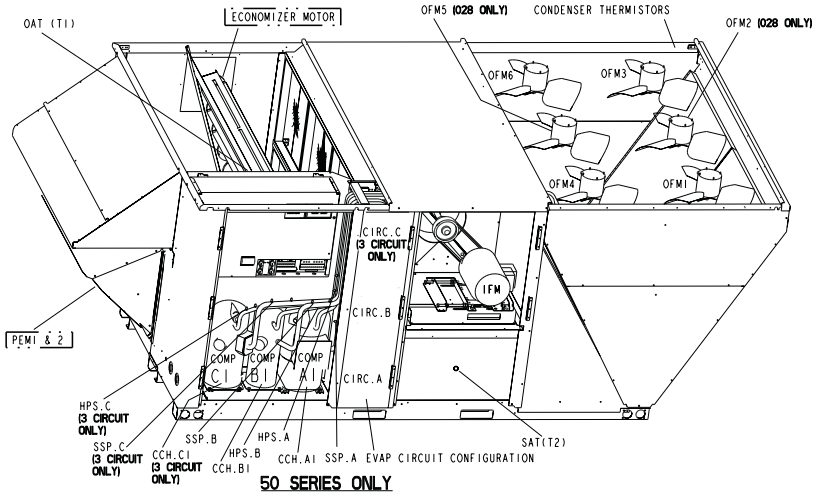
CONDENSER COIL

THERMISTOR LOCATIONS (HAIRPIN END)

PLUG LOCATION REFERENCE	
PL1	CONTROL BOX-TOP RIGHT (HEAT CONTROLS)
PL2	CONTROL BOX-BOTTOM (HPS. A, B, C)
PL3	HEAT SECTION PARTITION (HEAT CONTROLS)
PL4	FAN SECTION (INDOOR FAN MOTOR)
PL5	CONDENSER SECTION (OFM1, 2, 3)
PL6	CONDENSER SECTION (OFM4, 5, 6)
PL7	ECONOMIZER SECTION (ECONOMIZER MOTOR)
PL8	CONTROL BOX-BOTTOM (TRANSDUCERS SSP. A,B,C)
PL9	POWER EXHAUST SECTION (POWER EXHAUST MOTORS)
PL10	CONDENSER SECTION (OFM1)
PL11	CONDENSER SECTION (OFM2)
PL12	CONDENSER SECTION (OFM3)
PL13	CONDENSER SECTION (OFM4)
PL14	CONDENSER SECTION (OFM5)
PL15	CONDENSER SECTION (OFM6)



48 SERIES ONLY EVAP CIRCUIT CONFIGURATION



50 SERIES ONLY EVAP CIRCUIT CONFIGURATION

LEGEND FOR FIG. 1 TO 4

---.A	— Circuit A	IFC	— Indoor-Fan Contactor
AUX	— Auxiliary Contact	IFCB	— Indoor-Fan Circuit Breaker
---.B	— Circuit B	IFM	— Indoor-Fan Motor
---.C	— Circuit C	IGC	— Integrated Gas Controller
C	— Compressor, Contactor	LEN	— Local Equipment Network
CAP	— Capacitor	LS	— Limit Switch
CB	— Circuit Breaker	MBB	— Main Base Board
CCN	— Carrier Comfort Network	OAQ	— Outdoor-Air Quality
CCH	— Crankcase Heater	OAT	— Outdoor-Air Temperature
COMP	— Compressor	OFC	— Outdoor-Fan Contactor
CS	— Current Sensor	OFM	— Outdoor-Fan Motor
EC	— Enthalpy Control	PEC	— Power Exhaust Contactor
ECB	— Economizer Control Board	PEM	— Power Exhaust Motor
FIOP	— Factory-Installed Option	PL	— Plug
FS	— Flame Sensor	QC	— Quick Connect
FU	— Fuse	QT	— Quadruple Terminal
GV	— Gas Valve	RS	— Rollout Switch
HPS	— High-Pressure Switch	SAT	— Supply-Air Temperature
I	— Ignitor	SCT	— Saturated Condensing Temp
IAQ	— Indoor-Air Quality	SSP	— Saturated Suction Pressure
IDM	— Induced-Draft Motor	TB	— Terminal Block

TRAN	— Transformer
T-55	— Room Temp Device
T-56	— Room Temp Device with Set Point Adjustment
X	Terminal Block
	Terminal (Unmarked)
X	Terminal (Marked)
	Splice
	Factory Wiring
	Field Wiring
	To indicate common potential only, not to represent wiring.
	To indicate FIOP or Accessory

THERMOSTATIC/IGC MARKINGS

BM	— Blower Motor
C	— Common
CM	— Inducer Motor
CS	— Centrifugal Switch
G	— Fan
IFO	— Indoor Fan On
L1	— Line 1
R	— Thermostat Power
RT	— Power Supply
SS	— Speed Sensor
W	— Thermostat Heat
W1	— 1st Stage of Heating
W2	— 2nd Stage of Heating
X	— Alarm Output
Y1	— 1st Stage of Cooling
Y2	— 2nd Stage of Cooling

NOTES:
1. Factory wiring is in accordance with the National Electrical Codes. Any field modifications or additions must be in compliance with all applicable codes.
2. Use 75° C min wire for field power supply. Use copper wires for all units.
3. All circuit breakers Must Trip Amps are equal to or less than 156% RLA.
4. Compressor and fan motors are thermally protected. Three-phase motors protected against primary single-phase conditions.
5. Red jumper wire must be added between R and W1 for Space Temperature mode and temporarily during Service-Test mode when the heaters need to operate.

Fig. 4 — Typical Component Arrangement

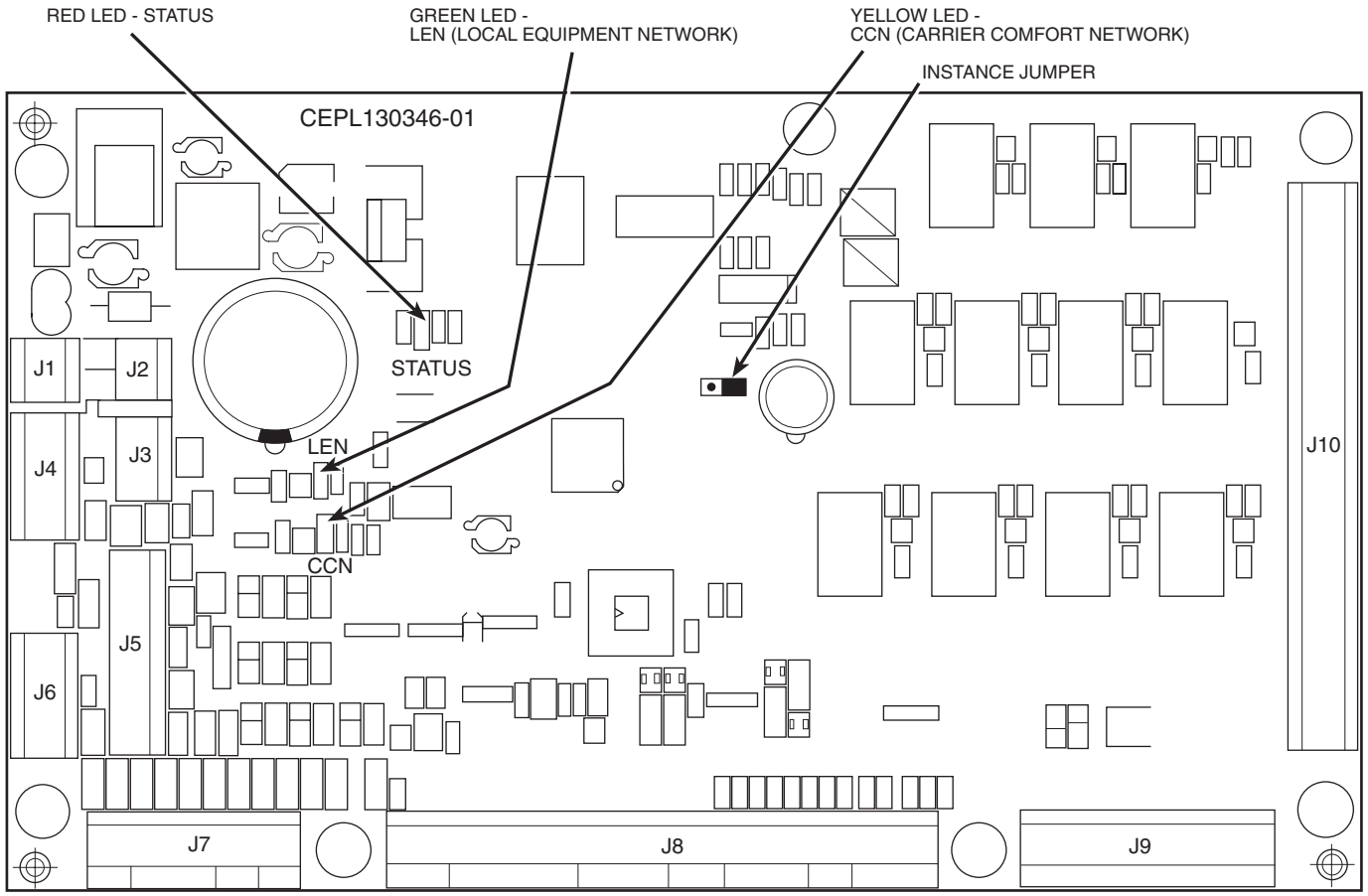


Fig. 5 — Main Base Board

Table 2 — Thermistor and Transducer Designations

SENSOR	PIN CONNECTION POINT	FUNCTION AND LOCATION	PART NO.
		Thermistors	
OAT	J8 — 5,6 (MBB)	Outside Air Temperature (OAT) — Attached to the economizer support bracket, behind the control box, inside the outside air duct of the economizer.	HH79NZ016
SAT	J8 — 7,8 (MBB)	Supply Air Temperature (SAT) — Inserted into the heat section underneath the indoor fan motor	HH79NZ079
SCT_A	J8 — 9,10 (MBB)	Saturated Condensing Temperature for Cir. A (SCT_A) — Circuit A condenser hairpin	HH79NZ013
SCT_B	J8 — 11,12 (MBB)	Saturated Condensing Temperature for Cir. B (SCT_B) — Circuit B condenser hairpin	
SCT_C	J8 — 13,14 (MBB)	Saturated Condensing Temperature for Cir. C (SCT_C) — Circuit C condenser hairpin	
		Transducers	
SSP_A	J8 — 18,19,20 (MBB)	Saturated Suction Pressure for Cir. A (SSP_A) — Suction line of Circuit A in compressor compartment	HK05YZ001
SSP_B	J8 — 21,22,23 (MBB)	Saturated Suction Pressure for Cir. B (SSP_B) — Suction line of Circuit B in compressor compartment	
SSP_C	J8 — 24,25,26 (MBB)	Saturated Suction Pressure for Cir. C (SSP_C) — Suction line of Circuit C in compressor compartment	

Table 3 — Discrete or Digital Inputs

INPUT	PIN CONNECTION POINT	TERMINAL CONNECTION POINT	COMMENT
Compressor Current Sensor A1	J9 — 10,11,12 (MBB)	—	Part No. = HK50AA035
Compressor Current Sensor B1	J9 — 7,8,9 (MBB)	—	
Compressor Current Sensor C1	J9 — 4,5,6 (MBB)	—	
Filter Status	J9 — 2,3 (MBB)	TB3 — 14,16	Part No. = HK06WC029
Fan Status	J8 — 15,16 (MBB)	TB3 — 11,12	Part No. = HK06WC028
Y1	J7 — 10 (MBB)	TB4 — 2	Thermostat Y1 (1st Stage Cooling)
Y2	J7 — 8 (MBB)	TB4 — 3	Thermostat Y2 (2nd Stage Cooling)
W1	J7 — 6 (MBB)	TB4 — 4	Thermostat W1 (1st Stage Heating)
W2	J7 — 4 (MBB)	TB4 — 5	Thermostat W2 (2nd Stage Heating)
G	J7 — 2 (MBB)	TB4 — 6	Thermostat G (Fan)
Fan Feedback	J7 — 4 (MBB)	—	Senses when the indoor fan is On
Shutdown	J6 — 5, 6 (MBB)	TB3 — 5,6	Request Unit Shutdown via smoke detector, etc.
Enthalpy	J5 — 4 (ECB)	TB5 — 1,4	Part No. = HH57AC077

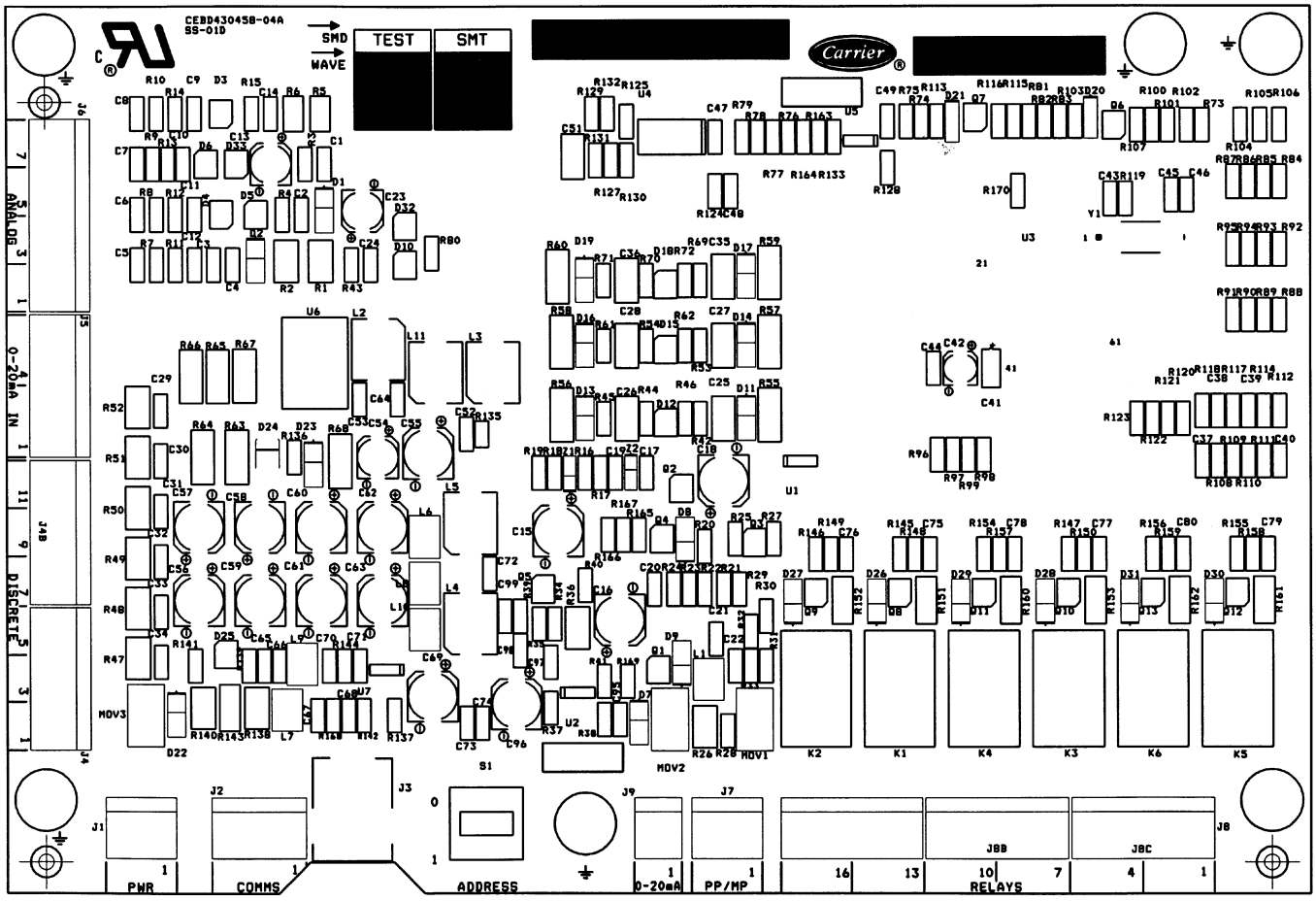


Fig. 6 — Economizer Control Board

Table 4 — Additional Analog Inputs

INPUT	PIN CONNECTION POINT	TERMINAL CONNECTION POINT	COMMENT
T55 Space Temperature (SPT)	J8 — 1,2 (MBB)	TB3 — 7,8	Part No. = CEC0121448-01
T56 Space Temperature (SPT) and Space Temperature Offset (SPTO)	J8 — 1,2,3 (MBB)	TB3 — 7,8,9	Part No. = CEC0121503-01
Indoor Air Quality (IAQ)	J5 — 2,3 (ECB)	TB5 — 2,3	
Outdoor Air Quality (OAQ)	J5 — 3,5 (ECB)	TB5 — 3,4	

LEGEND

ECB — Economizer Control Board
MBB — Main Base Board

Table 5 — Main Base Board and Economizer Control Board Outputs

OUTPUT	PIN CONNECTION POINT	DESCRIPTION
C.A1	J10 — 11 (MBB)	First compressor of Circuit A
C.B1	J10 — 9 (MBB)	First compressor of Circuit B
C.C1	J10 — 6 (MBB)	First compressor of Circuit C
IFC	J10 — 21 (MBB)	Request for indoor fan. IGC controls the Indoor Fan Motor (48HG only)
Fan Power	J10 — 3 (MBB)	Allows indoor fan to operate
OFC1	J10 — 19 (MBB)	Controls outdoor fan motor 1
OFC2	J10 — 16 (MBB)	Controls outdoor fan motor 3 and 6 (also 2 and 5 on size 028 units)
OFC3	J10 — 13 (MBB)	Controls outdoor fan motor 4
W1	J10 — 27 (MBB)	Request for first stage of heating. IGC controls heating (48HG only).
W2	J10 — 25 (MBB)	Second stage of heating.
ALARM	J10 — 23 (MBB)	TB4 — 7,8
Economizer Power	J8 — 18 (ECB)	ECB can turn off the power to the actuator
Economizer Control Signal	J7 — 1, 3 (ECB)	Belimo Communication Protocol
PE_1	J8 — 3 (ECB)	Power Exhaust Motor No. 1
PE_2	J8 — 6 (ECB)	Power Exhaust Motor No. 2

LEGEND

ECB — Economizer Control Board
IFC — Indoor-Fan Contactor
IGC — Integrated Gas Controller
MBB — Main Base Board
OFC — Outdoor-Fan Contactor

Table 6 — CCN Communication Bus Wiring

MANUFACTURER	PART NO.	
	Regular Wiring	Plenum Wiring
Alpha	1895	—
American	A21451	A48301
Belden	8205	884421
Columbia	D6451	—
Manhattan	M13402	M64430
Quabik	6130	—

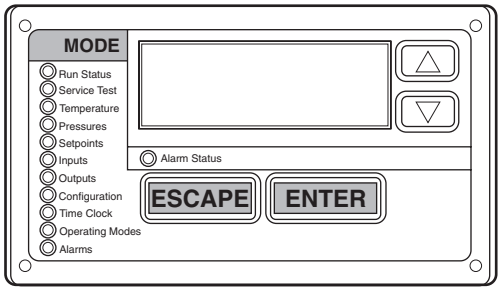


Fig. 7 — Scrolling *Comfort*Link™ Display

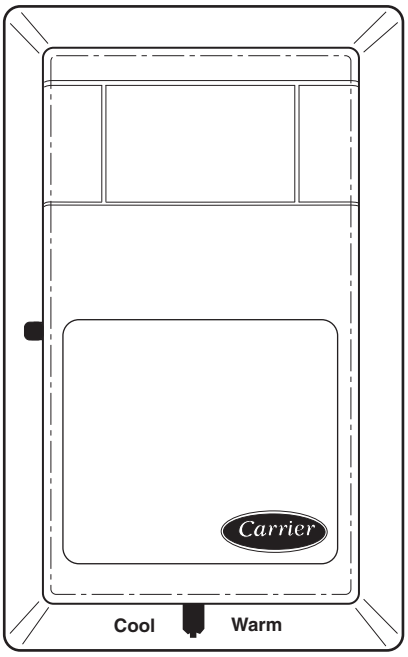


Fig. 8 — Space Temperature Sensor (P/N CEC0121503-01 Shown)

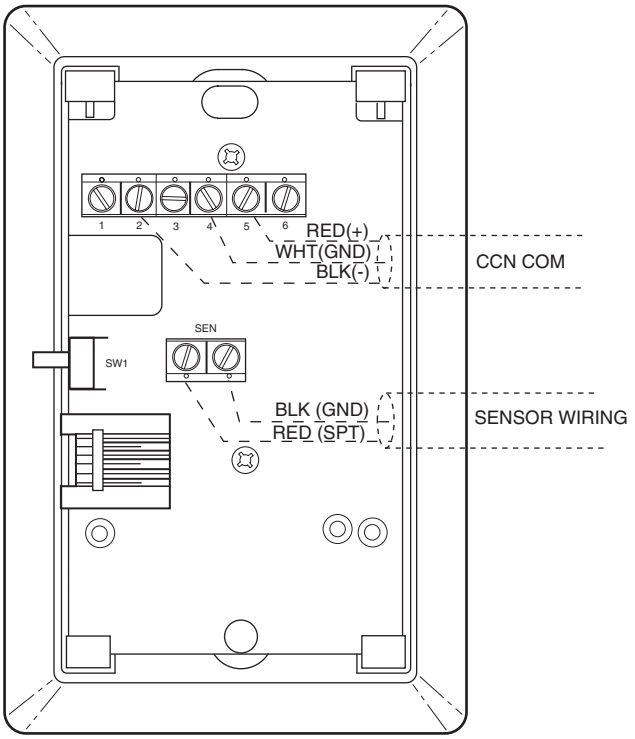
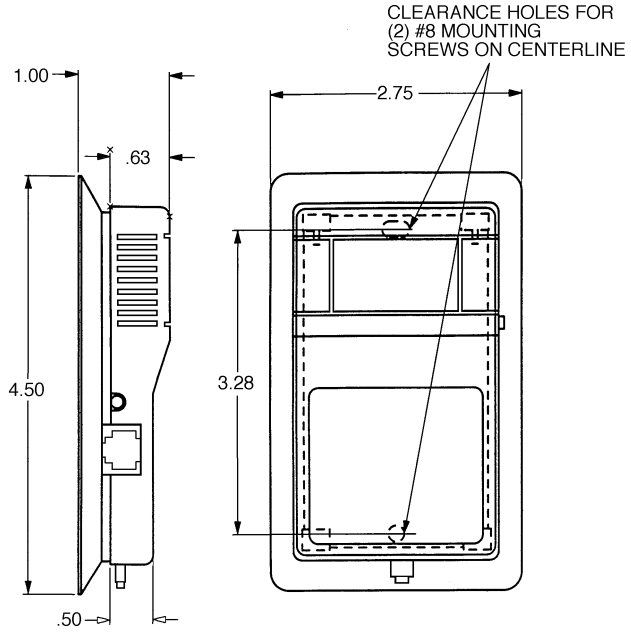


Fig. 10 — Space Temperature Sensor Wiring (CEC0121448-01)



NOTE: Dimensions are in inches.

Fig. 9 — Space Temperature Sensor Mounting

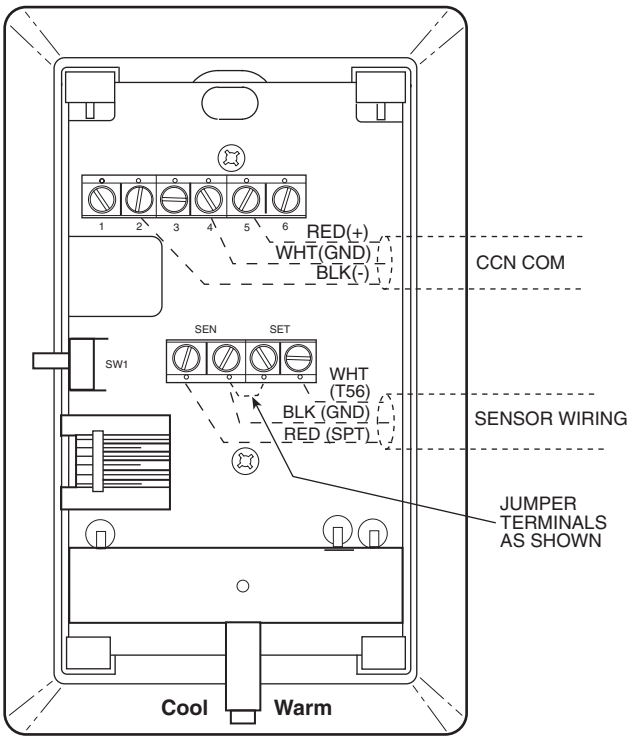


Fig. 11 — Space Temperature Sensor Wiring (CEC0121503-01)

INDOOR AIR QUALITY — The indoor air quality (IAQ) accessory (Part No. CRCBDIOX001A00) is a field-installed accessory. This sensor measures CO_2 concentrations in the unit return. The defaults for IAQ configurations should be satisfactory; however, if they are not, additional information about these configurations can be found in the Indoor Air Quality section.

SMOKE DETECTOR — The smoke detector accessory (Part No. CRSMKDET001A00) is a field-installed accessory. This accessory detects smoke in the return duct. When installing this accessory, set the switch configuration to normally open or normally closed as wired (FS.SW). Normally closed (2) is the preferred configuration.

FILTER STATUS — The filter status accessory (Part No. CRSTATUS002A00) is a field-installed accessory. This acces-sory detects plugged filters. When installing this acces-sory, set the switch configuration to normally open or normally closed as wired (FL.SW). Normally open (1) is the preferred configu-ration.

FAN STATUS — The fan status accessory (Part No. CRSTATUS003A00) is a field-installed accessory. This accessory detects when the indoor fan is blowing air. When installing this accessory, set the switch configuration to nor-mally open or normally closed as wired (FN.SW). Normally open (1) is the preferred configuration.

ENTHALPY SENSORS — The enthalpy accessories (Part No. CRENTSNG001A00 or CRDENTDIF001A00) are field-installed accessories. The first accessory (outdoor air only) determines when the enthalpy is low relative to a fixed reference. The second accessory (outdoor and return enthalpy are measured) compares the enthalpy between the outdoor and return air streams. In each case, the enthalpy 4-20mA signals are converted to a switch output which is read by the ECB. When installing this accessory, set the switch configuration to normally open or normally closed as wired (EN.SW). Normally open (1) is the preferred configuration.

CONTROLS AND FUNCTIONS

Marquee Display Usage — See Fig. 7 and Tables 7-21. The display module provides the user interface to the *Comfort*Link™ control system. The display has up and down arrow keys, an ESCAPE key, and an ENTER key. These keys are used to navigate through the different levels of the display structure. See Table 7. Press the ESCAPE key until the display is blank to move through the top 11 mode levels indicated by LEDs on the left side of the display.

When a specific item is located, the display will flash showing the operator the item, followed by the item value and then followed by the item units (if any). Press the ENTER key to stop the display at the item value. Items in the Configuration and Service Test modes are password protected. The display will flash PASS and WORD when required. Use the ENTER and arrow keys to enter the 4 digits of the password. The default password is 1111.

Pressing the ESCAPE and ENTER keys simultaneously will scroll a clear language text description across the display indicating the full meaning of each display acronym. Pressing the ESCAPE and ENTER keys when the display is blank (Mode LED level) will return the display to its default menu of rotating display items. In addition, the password will be disabled requiring that it be entered again before changes can be made to password protected items.

Changing item values or testing outputs is accomplished in the same manner. Locate and display the desired item. Press the ENTER key to stop the display at the item value. Press the ENTER key again so that the item value flashes. Use the arrow keys to change the value or state of an item and press the ENTER key to accept it. Press the ESCAPE key and the item, value, or units display will resume. Repeat the process as required for other items. See Tables 7-21 for further details.

Clearing Unit Alarms — The unit alarms can be cleared through the *Comfort*Link display. To check the current alarms, enter into the Alarms menu. The first submenu is the CURR submenu. The CURR function displays the list of current alarms (maximum of 25). The second submenu item is the R.CUR (Reset Current Alarms) function. Press ENTER to reset the current alarms. The next submenu item, HIST, displays the list of cleared alarms (maximum of 20). The HIST function can be cleared with the R.HIS function. See Tables 21 and 22.

Service Test — The Service Test function can be used to verify proper operation of compressors, indoor, outdoor and power exhaust fans, heaters, economizer and alarm relay. Refer to Table 9. Use the display keys to enter the mode and display TEST. Press ENTER twice so that OFF flashes. Enter the password if required (1111 default). Use either arrow key to change the TEST value to the ON position and press ENTER. By selecting ON, Service Test mode is now enabled. Press ESCAPE and the button to enter the INDP, FANS, COOL or HEAT submodes.

Of these four submodes, only INDP is independent, and therefore only its items can be changed at any time without affecting the performance of other items (FANS, COOL or HEAT submodes). For example, if A1 was selected from the COOL submode, compressor A1 would operate with the indoor fan and necessary outdoor fans. If ECON (part of INDP) was changed, the performance of the COOL outputs would not be affected. However, if the user selected IDF from FANS, all of the outputs currently operating because of A1, including IDF, would be turned off and then IDF would be turned on again after a small delay. The ECON setting, as a member of INDP, would not be affected.

This system of dependent and independent submodes was developed to ensure that the indoor and outdoor fans were adequately controlled at all times. It was also implemented to make sure that certain outputs, which could cause the MCA (Minimum Current Amps) and the MOCP (Maximum Overcurrent Protection) of the unit to be exceeded, do not operate at the same time.

The INDP submode can used to test the system outputs that are independent and can operate in all modes: fan only, cooling and heating. These outputs are ECON, E.PWR, PE.1, PE.2 and ALM.

When an economizer output (ECON) other than zero is selected, the economizer power relay E.PWR will automatically be turned ON and the economizer is moved to the selected position. Afterwards, the user can turn off the power to the economizer by setting E.PWR to OFF. However, this will not turn off ECON. If the user reselects ECON, the economizer power relay will once again be turned ON.

Table 7 — Marquee Display Menu Structure

RUN STATUS	SERVICE TEST	TEMPERATURES	PRESSURES	SET POINTS	INPUTS	OUTPUTS	CONFIGURATION	TIME CLOCK	OPERATING MODES	ALARMS
Auto Display (VIEW)	Manual Mode On/Off (TEST)	Unit Temperatures (UNIT)	Circuit A Pressures (CIR.A)	Cooling (COOL)	Thermostat Inputs (STAT)	Fans (FANS)	Unit Configuration (UNIT)	Time (TIME)	System (SYS)	Current Alarms (CURR)
Software Version (VERS)	Test Independent Outputs (INDP)	Circuit A Temperatures (CIR.A)	Circuit B Pressures (CIR.B)	Heating (HEAT)	Switch Inputs (SW.IN)	Compressor (CMPR)	Cooling Configuration (COOL)	Date (DATE)	HVAC (HVAC)	Reset Current Alarms (R.CUR)
Run Hours (HRS)	Test Fans (FANS)	Circuit B Temperatures (CIR.B)	Circuit C Pressures (CIR.C)	Supply Air (SAT)	IAQ Inputs (AQ.IN)	Heat (HEAT)	Heating Configuration (HEAT)	Occupancy Schedule Number (SCH.N)		Alarm History (HIST)
Component Cycles (CYCS)	Test Cooling (COOL)	Circuit C Temperatures (CIR.C)		Heat-Cool Set Point Gap (HC.SG)	Compressor Current Sense (CS.IN)	Economizer (ECON)	Economizer Configuration (ECON)	Local Occupancy Schedule (SCH.L)		Reset Alarm History (R.HIS)
Compressor Time Guard (TMGD)	Test Heating (HEAT)						IAQ Configuration (IAQ)			
							CCN Configuration (CCN)			
							Display Configuration (DISP)			

Table 8 — "Run Status" Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
VIEW	ENTER			Auto View of Run Status	
	▼	SAT	XXX.X	Supply Air Temperature	
	▼	OCC	YES/NO	Currently Occupied	
	▼	ALRM	XX	Current Alarms & Alerts	
	▼	TIME	XX.XX	Time of Day	00.0 – 23.59
VERS	ENTER			Software Version Numbers	
	▼	MBB		CESR131248-XX-XX	
	▼	ECB		CESR131249-XX-XX	
	▼	MARQ		CESR131171-XX-XX	
HRS	ENTER			Component Run Hours	
	▼	A1	XXXX	Comp A1 Run Hours	
	▼	B1	XXXX	Comp B1 Run Hours	
	▼	C1	XXXX	Comp C1 Run Hours	
	▼	IDF	XXXX	Indoor Fan Run Hours	
	▼	OFC.1	XXXX	OD Fan Cont. 1 Run Hours	
	▼	OFC.2	XXXX	OD Fan Cont. 2 Run Hours	
	▼	OFC.3	XXXX	OD Fan Cont. 3 Run Hours	
	▼	HTR.1	XXXX	Heat Stage 1 Run Hours	
	▼	HTR.2	XXXX	Heat Stage 2 Run Hours	
	▼	PE.1	XXXX	Power Exhaust1 Run Hours	
	▼	PE.2	XXXX	Power Exhaust2 Run Hours	
	▼	E.PWR	XXXX	Economizer Pwr Run Hours	
	▼	ALM	XXXX	Alarm Output Run Hours	

Table 8 — "Run Status" Mode and Submode Directory (cont)

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
CYCS	ENTER			Component Cycles	
	▼	A1	XXXX	Compressor A1 Cycles	
	▼	B1	XXXX	Compressor B1 Cycles	
	▼	C1	XXXX	Compressor C1 Cycles	
	▼	IDF	XXXX	Indoor Fan Cycles	
	▼	OFC.1	XXXX	OD Fan Contact. 1 Cycles	
	▼	OFC.2	XXXX	OD Fan Contact. 2 Cycles	
	▼	OFC.3	XXXX	OD Fan Contact. 3 Cycles	
	▼	HTR.1	XXXX	Heat Stage 1 Cycles	
	▼	HTR.2	XXXX	Heat Stage 2 Cycles	
	▼	PE.1	XXXX	Power Exhaust 1 Cycles	
	▼	PE.2	XXXX	Power Exhaust 2 Cycles	
	▼	E.PWR	XXXX	Economizer Power Cycles	
	▼	ALM	XXXX	Alarm Output Cycles	
TMGD	ENTER			Comp/Heater Timeguards	
	▼	TG.A1	XXX	A1 Timeguard (secs)	
	▼	TG.B1	XXX	B1 Timeguard (secs)	
	▼	TG.C1	XXX	C1 Timeguard (secs)	
	▼	TG.H1	XXX	Heat 1 Timeguard (secs)	
	▼	TG.H2	XXX	Heat 2 Timeguard (secs)	

Table 9 — "Service Test" Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
TEST	ENTER		ON/OFF	Field Service Test Mode	Use to Enable/Disable Manual Mode
INDP	ENTER			Test Independent Outputs	
	▼	ECON	XXX	Economizer Position Test	%
	▼	E.PWR	ON/OFF	Economizer Power Test	
	▼	PE.1	ON/OFF	Power Exhaust 1 Test	
	▼	PE.2	ON/OFF	Power Exhaust 2 Test	
	▼	ALM	ON/OFF	Alarm Relay Test	
FANS	ENTER			Test Fans	
	▼	IDF	ON/OFF	Indoor Fan Test	
	▼	IDFP	ON/OFF	Indoor Fan Power Test	
	▼	OFC.1	ON/OFF	Outdoor Fan Cntr 1 Test	
	▼	OFC.2	ON/OFF	Outdoor Fan Cntr 2 Test	
	▼	OFC.3	ON/OFF	Outdoor Fan Cntr 3 Test	
COOL	ENTER			Test Cooling	
	▼	A1	ON/OFF	Compressor A1 Test	
	▼	B1	ON/OFF	Compressor B1 Test	
	▼	C1	ON/OFF	Compressor C1 Test	
HEAT				Test Heating	
	▼	HTR.1	ON/OFF	Heat Stage 1 Test	
	▼	HTR.2	ON/OFF	Heat Stage 2 Test	

Table 10 — "Temperatures" Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
UNIT	ENTER			Unit Temperatures	
	▼	SAT	XXX.X	Supply Air Temperature	
	▼	OAT	XXX.X	Outdoor Air Temperature	
	▼	SPT	XXX.X	Space Temperature	
	▼	SPTO	X.X	Space Temperature Offset	
CIR.A	ENTER			Circuit A Temperatures	
	▼	SST.A	XXX.X	Saturated Suct Temp A	Temperature is calculated
	▼	SCT.A	XXX.X	Saturated Cond Temp A	
CIR.B	ENTER			Circuit B Temperatures	
	▼	SST.B	XXX.X	Saturated Suct Temp B	Temperature is calculated
	▼	SCT.B	XXX.X	Saturated Cond Temp B	
CIR.C	ENTER			Circuit C Temperatures	
	▼	SST.C	XXX.X	Saturated Suct Temp C	Temperature is calculated
	▼	SCT.C	XXX.X	Saturated Cond Temp C	

Table 11 — "Pressures" Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
CIR.A	ENTER			Circuit A Pressures	
	▼	SSP.A	XXX.X	Saturated Suct Press A	
	▼	SCP.A	XXX.X	Saturated Cond Press A	Pressure is calculated
CIR.B	ENTER			Circuit B Pressures	
	▼	SSP.B	XXX.X	Saturated Suct Press B	
	▼	SCP.B	XXX.X	Saturated Cond Press B	Pressure is calculated
CIR.C	ENTER			Circuit C Pressures	
	▼	SSP.C	XXX.X	Saturated Suct Press C	
	▼	SCP.C	XXX.X	Saturated Cond Press C	Pressure is calculated

Table 12 — Reading and Changing Cooling Occupied Set Point

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
COOL	ENTER	OCSP	78	Occupied Cool Set point	Default: 78
	ENTER		78		Scrolling Stops
	ENTER		78		Value flashes
	▼				Select 75
	ENTER		75		Change accepted
	ESCAPE	OCSP	75	Occupied Cool Set point	Item/Value/Units scroll again

Table 13 — "Set Points" Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
COOL	ENTER			Cooling Set points	
	▼	OCSP	XX	Occupied Cool Set point	Default: 78
	▼	UCSP	XX	Unoccupied Cool Set point	Default: 85
HEAT	ENTER			Heating Set points	
	▼	OHSP	XX	Occupied Heat Set point	Default: 68
	▼	UHSP	XX	Unoccupied Heat Set point	Default: 60
SAT	ENTER			Supply Air Set points	
	▼	LCSP	XX	Low Cool SAT Set point	Default: 65
	▼	HCSP	XX	High Cool SAT Set point	Default: 55
	▼	MIN.L	XX.X	Minimum SAT Lower Level	Default: 48.0
	▼	MIN.H	XX.X	Minimum SAT Upper Level	Default: 58.0
HC.SG	ENTER	HC.SG	XX	Heat-Cool Set point Gap	Default: 5

Table 14 — “Inputs” Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
STAT	ENTER			Thermostat Inputs	
	▼	Y1	ON/OFF	Thermostat Y1 Input	
	▼	Y2	ON/OFF	Thermostat Y2 Input	
	▼	W1	ON/OFF	Thermostat W1 Input	
	▼	W2	ON/OFF	Thermostat W2 Input	
	▼	G	ON/OFF	Thermostat G Input	
SW.IN	ENTER			Switch Inputs	
	▼	FIL.S	DRT/CLN	Filter Status	
	▼	FAN.S	ON/OFF	Fan Status	
	▼	FDWN	ON/OFF	Unit Shutdown Input	
	▼	ENTH	HIGH/LOW	Enthalpy Switch Input	
AQ.IN	ENTER			IAQ Inputs	
	▼	IAQ	XXXX	Indoor Air Quality	
	▼	OAQ	XXXX	Outdoor Air Quality	
CS.IN	ENTER			Current Sensor Inputs	
	▼	CS.A1	ON/OFF	A1 Current Sensor	
	▼	CS.B1	ON/OFF	B1 Current Sensor	
	▼	CS.C1	ON/OFF	C1 Current Sensor	

Table 15 — “Outputs” Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
FANS	ENTER			Fan Outputs	
	▼	IDF	ON/OFF	Indoor Fan	
	▼	IDFP	ON/OFF	Indoor Fan Power	
	▼	OFC.1	ON/OFF	Outdoor Fan Contactor 1	
	▼	OFC.2	ON/OFF	Outdoor Fan Contactor 2	
	▼	OFC.2	ON/OFF	Outdoor Fan Contactor 3	
CMPR	ENTER			Compressor Outputs	
	▼	A1	ON/OFF	Compressor A1	
	▼	B1	ON/OFF	Compressor B1	
	▼	C1	ON/OFF	Compressor C1	
HEAT	ENTER			Heat Outputs	
	▼	HTR.1	ON/OFF	Heat Stage 1	
	▼	HTR.2	ON/OFF	Heat Stage 2	
ECON	ENTER			Economizer Outputs	
	▼	EC.AP	XXX	Economizer Position	
	▼	EC.CP	XXX	Economizer Commanded Pos	
	▼	E.PWR	ON/OFF	Economizer Power	
	▼	PE.1	ON/OFF	Power Exhaust Relay 1	
	▼	PE.2	ON/OFF	Power Exhaust Relay 2	

Table 16 — "Configuration" Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
UNIT	ENTER			Unit Configuration	
	▼	U.CTL	X	Unit Control Type	Default: 1 1 = Auto Select 2 = Thermostat 3 = Space Sensor
	▼	T.CTL	X	Thermostat Control Type	Default: 0 0 = Adaptive 1 = 1 Stage Y1 2 = 2 Stage Y1
	▼	OC.FN	YES/NO	Fan On When Occupied	Default: YES
	▼	IDF.F	YES/NO	Shut Down On IDF Failure	Default: YES
	▼	S.DLY	XXX	Start Up Delay	Default: 30 sec
	▼	FN.SW	X	Fan Status Input	Default: 0 0 = No Switch 1 = Normal Open 2 = Normal Close
	▼	FL.SW	X	Filter Status Input	Default: 0 0 = No Switch 1 = Normal Open 2 = Normal Close
	▼	FS.SW	X	Fire Shutdown Input	Default: 0 0 = No Switch 1 = Normal Open 2 = Normal Close
	▼	ECB	YES/NO	ECB Installed	Default: YES
	▼	SAT.T	XXX	SAT Settling Time (Secs)	Default: 240 sec
	▼	N.CMP	X	Number of Compressors	Default: 3 (016-024), 2 (014,028)
COOL	ENTER			Cooling Configuration	
	▼	MC.LO	XX	Compressor Lockout Temp	Default: 40 F
	▼	MRT.C	XXX	Compressor Min On Time	Default: 180 sec
	▼	MOT.C	XXX	Compressor Min Off Time	Default: 300 sec
	▼	CL.PD	X.X	SPT Cool Demand(+) Level	Default: 1.0 ΔF
	▼	CL.ND	X.X	SPT Cool Demand (–) Level	Default: –1.0 ΔF
	▼	C.LAG	X.X	Cool Thermal Lag Factor	Default: 1.0 min
	▼	SA.PD	X.X	SAT Cool Demand (+) Level	Default: 1.0 ΔF
	▼	SA.ND	X.X	SAT Cool Demand (–) Level	Default: –1.0 ΔF
	▼	C.INC	XXX	Cool Stage Increase Secs	Default: 450 sec
	▼	C.DEC	XXX	Cool Stage Decrease Secs	Default: 300 sec
	▼	A.NOW	YES/NO	Alert Each Strike	Default: YES
	▼	INV.E	YES/NO	Invert Evaporators	Default: YES
	▼	A1.CS	YES/NO	A1 Current Sensing	Default: YES
	▼	B1.CS	YES/NO	B1 Current Sensing	Default: YES
	▼	C1.CS	YES/NO	C1 Current Sensing	Default: YES
HEAT	ENTER			Heating Configuration	
	▼	HT.TY	X	Type of Heat Installed	Default: 0 0: No Heat 1: Gas 2: Electric
	▼	HT.LO	XX	Heating Lockout Temp	Default: 75 F
	▼	MRT.H	XXX	Heat Minimum On Time	Default: 120 sec
	▼	MOT.H	XXX	Heat Minimum Off Time	Default: 120 sec
	▼	HT.PD	X.X	SPT Heat Demand (+) Level	Default: 1.0 ΔF
	▼	HT.ND	X.X	SPT Heat Demand (–) Level	Default: –1.0 ΔF

Table 16 — "Configuration" Mode and Submode Directory (cont)

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
HEAT (cont)	▼	H.LAG	X.X	Heat Thermal Lag Factor	Default: 1.0 min
	▼	H.INC	XXX	Heat Stage Increase Secs	Default: 450 sec
	▼	H.DEC	XXX	Heat Stage Decrease Secs	Default: 300 sec
ECON	ENTER			Economizer Configuration	
	▼	EC.EQ	YES/NO	Economizer Equipped Unit	Default: NO
	▼	MIN.P	XXX	Economizer Min Position	Default: 30 %
	▼	ECL.H	XX	Econ High Temp Lockout	Default: 65 F
	▼	ECL.L	XX	Econ Low Temp Lockout	Default: 0 F
	▼	FC.EN	YES/NO	Unoccupied Free Cooling	Default: Yes
	▼	EN.SW	X	Enthalpy Switch Input	Default: 0 0: No Switch 1: Normal Open 2: Normal Close
	▼	PE.EN	YES/NO	Power Exhaust Control	Default: NO
	▼	PE1.P	XXX	PE Stage1 Econo Position	Default: 25 %
	▼	PE2.P	XXX	PE Stage2 Econo Position	Default: 75 %
IAQ	ENTER			IAQ Configuration	
	▼	AQ.MP	XXX	Minimum IAQ Position	Default: 10 %
	▼	MIN.P	XXX	Economizer Min Position	Default: 30 %
	▼	AQD.L	XXX	AQ Differential Low	Default: 100 PPM
	▼	AQD.H	XXXX	AQ Differential High	Default: 700 PPM
	▼	I.4M	XXXX	IAQ Sensor Value at 4MA	Default: 0 PPM
	▼	I.20M	XXXX	IAQ Sensor Value at 20MA	Default: 2000 PPM
	▼	O.4M	XXXX	OAQ Sensor Value at 4MA	Default: 0 PPM
	▼	O.20M	XXXX	OAQ Sensor Value at 20MA	Default: 2000 PPM
	▼	OAQ.L	XXXX	OAQ Lockout Value	Default: 600 PPM
CCN	ENTER			CCN Configuration	
	▼	CCN.A	XXX	CCN Address	Default: 1 Range: 1 to 239
	▼	CCN.B	XXX	CCN Bus Number	Default: 0 Range: 1 to 239
	▼	BAUD	X	CCN Baud Rate	Default: 3 1 = 2400 2 = 4800 3 = 9600 4 = 19,200 5 = 38,400
DISP	ENTER			Display Configuration	
	▼	METR	YES/NO	Metric Display	Default: NO YES = Metric NO = English
	▼	LANG	X	Language Selection	Default: 0 0 = English 1 = Espanol 2 = Francais 3 = Portuguese
	▼	PROT	ENBL/DSBL	Password Protection	Default = Disabled
	▼	PSWD	XXXX	User Password	Default = 1111
	▼	TEST	ON/OFF	Test Display LEDs	

LEGEND

AQ — Air Quality
CCN — Carrier Comfort Network
ECB — EconoMi$er Control Board
IAQ — Indoor-Air Quality
IDF — Indoor Fan
OAQ — Outdoor-Air Quality
PE — Power Exhaust
SAT — Supply Air Temperature
SPT — Space Temperature

Table 17 — Example of Changing the CCN Configuration

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
CCN	ENTER	CCN.A	1	CCN Address	Default: 1
	ENTER		1		Scrolling Stops
	ENTER				Value flashes
	▲				Select 2
	ENTER				Change accepted
	ESCAPE	CCN.A			Item/Value/Units scroll again
	▼	CCN.B		CCN Bus Number	No change
	▼	BAUD		CCN Baud Rate	Default: 3 = 9600
	ENTER		3		Scrolling Stops
	ENTER		3		Value flashes
	▲				Select 5 = 38,400
	ENTER		5		Change accepted
	ESCAPE	BAUD	5	CCN Baud Rate	Item/Value/Units scroll again

Table 18 — "Time Clock" Mode and Submode Directory

SUBMODE	SUB-SUB MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
TIME		ENTER	TIME	XX.XX	Hour and Minute	Military (00.00-23.59)
DATE		ENTER			Current Date	
		▼	MNTH	XX	Month of Year	1=Jan, 2=Feb, etc.
		▼	DOM	XX	Day of Month	Range 1-31
		▼	YEAR	XXXX	Year	
		▼	DAY	XX	Day of Week	1=Mon, 2=Tue, etc.
SCH.N		ENTER	SCH.N	XX	Occupancy Schedule Num.	0 = Always Occupied 1 – 64 = Local Schedule 65 – 99 = Global Schedule
SCH.L		ENTER			Local Occupancy Schedule	
	PER.1	ENTER			Occupancy Period 1	
		▼	OCC.1	XX.XX	Period Occupied Time	Range: 00.00 to 23.59; Default: 00.00
		▼	UNC.1	XX.XX	Period Unoccupied Time	Range: 00.00 to 23.59; Default: 00.00
		▼	MON.1	YES/NO	Monday In Period	Default = No
		▼	TUE.1	YES/NO	Tuesday In Period	Default = No
		▼	WED.1	YES/NO	Wednesday In Period	Default = No
		▼	THU.1	YES/NO	Thursday In Period	Default = No
		▼	FRI.1	YES/NO	Friday In Period	Default = No
		▼	SAT.1	YES/NO	Saturday In Period	Default = No
		▼	SUN.1	YES/NO	Sunday In Period	Default = No
		ESCAPE	HOL.1	YES/NO	Holiday In Period	Default = No
	PER.2	ENTER			Occupancy Period 2	
		▼	OCC.2	XX.XX	Period Occupied Time	Range: 00.00 to 23.59; Default: 00.00
		▼	UNC.2	XX.XX	Period Unoccupied Time	Range: 00.00 to 23.59; Default: 00.00

Table 18 — "Time Clock" Mode and Submode Directory (cont)

SUBMODE	SUB-SUB MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
SCH.L (cont)	PER.2 (cont)	▼	MON.2	YES/NO	Monday In Period	Default = No
		▼	TUE.2	YES/NO	Tuesday In Period	Default = No
		▼	WED.2	YES/NO	Wednesday In Period	Default = No
		▼	THU.2	YES/NO	Thursday In Period	Default = No
		▼	FRI.2	YES/NO	Friday In Period	Default = No
		▼	SAT.2	YES/NO	Saturday In Period	Default = No
		▼	SUN.2	YES/NO	Sunday In Period	Default = No
		ESCAPE	HOL.2	YES/NO	Holiday In Period	Default = No
	PER.3	ENTER			Occupancy Period 3	
		▼	OCC.3	XX.XX	Period Occupied Time	Range: 00.00 to 23.59; Default: 00.00
		▼	UNC.3	XX.XX	Period Unoccupied Time	Range: 00.00 to 23.59; Default: 00.00
		▼	MON.3	YES/NO	Monday In Period	Default = No
		▼	TUE.3	YES/NO	Tuesday In Period	Default = No
		▼	WED.3	YES/NO	Wednesday In Period	Default = No
		▼	THU.3	YES/NO	Thursday In Period	Default = No
		▼	FRI.3	YES/NO	Friday In Period	Default = No
		▼	SAT.3	YES/NO	Saturday In Period	Default = No
		▼	SUN.3	YES/NO	Sunday In Period	Default = No
		ESCAPE	HOL.3	YES/NO	Holiday In Period	Default = No
	PER.4	ENTER			Occupancy Period 4	
		▼	OCC.4	XX.XX	Period Occupied Time	Range: 00.00 to 23.59; Default: 00.00
		▼	UNC.4	XX.XX	Period Unoccupied Time	Range: 00.00 to 23.59; Default: 00.00
		▼	MON.4	YES/NO	Monday In Period	Default = No
		▼	TUE.4	YES/NO	Tuesday In Period	Default = No
		▼	WED.4	YES/NO	Wednesday In Period	Default = No
		▼	THU.4	YES/NO	Thursday In Period	Default = No
		▼	FRI.4	YES/NO	Friday In Period	Default = No
		▼	SAT.4	YES/NO	Saturday In Period	Default = No
		▼	SUN.4	YES/NO	Sunday In Period	Default = No
		ESCAPE	HOL.4	YES/NO	Holiday In Period	Default = No
	PER.5	ENTER			Occupancy Period 5	
		▼	OCC.5	XX.XX	Period Occupied Time	Range: 00.00 to 23.59; Default: 00.00
		▼	UNC.5	XX.XX	Period Unoccupied Time	Range: 00.00 to 23.59; Default: 00.00
		▼	MON.5	YES/NO	Monday In Period	Default = No
		▼	TUE.5	YES/NO	Tuesday In Period	Default = No
		▼	WED.5	YES/NO	Wednesday In Period	Default = No
		▼	THU.5	YES/NO	Thursday In Period	Default = No
		▼	FRI.5	YES/NO	Friday In Period	Default = No
		▼	SAT.5	YES/NO	Saturday In Period	Default = No

Table 18 — "Time Clock" Mode and Submode Directory (cont)

SUBMODE	SUB-SUB MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
SCH.L (cont)	PER.5 (cont)	▼	SUN.5	YES/NO	Sunday In Period	Default = No
		ESCAPE	HOL.5	YES/NO	Holiday In Period	Default = No
	PER.6	ENTER			Occupancy Period 6	
		▼	OCC.6	XX.XX	Period Occupied Time	Range: 00.00 to 23.59; Default: 00.00
		▼	UNC.6	XX.XX	Period Unoccupied Time	Range: 00.00 to 23.59; Default: 00.00
		▼	MON.6	YES/NO	Monday In Period	Default = No
		▼	TUE.6	YES/NO	Tuesday In Period	Default = No
		▼	WED.6	YES/NO	Wednesday In Period	Default = No
		▼	THU.6	YES/NO	Thursday In Period	Default = No
		▼	FRI.6	YES/NO	Friday In Period	Default = No
		▼	SAT.6	YES/NO	Saturday In Period	Default = No
		▼	SUN.6	YES/NO	Sunday In Period	Default = No
		ESCAPE	HOL.6	YES/NO	Holiday In Period	Default = No
	PER.7	ENTER			Occupancy Period 7	
		▼	OCC.7	XX.XX	Period Occupied Time	Range: 00.00 to 23.59; Default: 00.00
		▼	UNC.7	XX.XX	Period Unoccupied Time	Range: 00.00 to 23.59; Default: 00.00
		▼	MON.7	YES/NO	Monday In Period	Default = No
		▼	TUE.7	YES/NO	Tuesday In Period	Default = No
		▼	WED.7	YES/NO	Wednesday In Period	Default = No
		▼	THU.7	YES/NO	Thursday In Period	Default = No
		▼	FRI.7	YES/NO	Friday In Period	Default = No
		▼	SAT.7	YES/NO	Saturday In Period	Default = No
		▼	SUN.7	YES/NO	Sunday In Period	Default = No
		ESCAPE	HOL.7	YES/NO	Holiday In Period	Default = No
	PER.8	ENTER			Occupancy Period 8	
		▼	OCC.8	XX.XX	Period Occupied Time	Range: 00.00 to 23.59; Default: 00.00
		▼	UNC.8	XX.XX	Period Unoccupied Time	Range: 00.00 to 23.59; Default: 00.00
		▼	MON.8	YES/NO	Monday In Period	Default = No
		▼	TUE.8	YES/NO	Tuesday In Period	Default = No
		▼	WED.8	YES/NO	Wednesday In Period	Default = No
		▼	THU.8	YES/NO	Thursday In Period	Default = No
		▼	FRI.8	YES/NO	Friday In Period	Default = No
		▼	SAT.8	YES/NO	Saturday In Period	Default = No
		▼	SUN.8	YES/NO	Sunday In Period	Default = No
		ESCAPE	HOL.8	YES/NO	Holiday In Period	Default = No

Table 19 — Setting an Occupied Time Schedule – Weekdays Only for 7:30 to 22:30

SUBMODE	SUB-SUB MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
SCH.L		ENTER			Local Occupancy Schedule	
	PER.1	ENTER	OCC.1		Period Occupied Time	
		ENTER		00.00		Scrolling stops
		ENTER		00.00		Hours Flash
		▲		07.00		Select 7
		ENTER		07.00		Change accepted, minutes flash
		▲		07.30		Select 30
		ENTER		07.30		Change accepted
		ESCAPE	OCC.1	07.30	Period Occupied Time	Item/Value/Units scrolls again
		▼	UNC.1	00.00	Period Unoccupied Time	
		ENTER		00.00		Scrolling stops
		ENTER		00.00		Hours Flash
		▲		22.00		Select 22
		ENTER		22.00		Change accepted, minutes flash
		▲		22.30		Select 30
		ENTER		22.30		Change accepted
		ESCAPE	UNC.1	22.30	Period Unoccupied Time	Item/Value/Units scrolls again
		▼	MON.1	NO	Monday In Period	
		ENTER		NO		Scrolling stops
		▲		YES		Select YES
		ENTER		YES		Changed accepted
		ESCAPE	MON.1	YES	Monday In Period	Item/Value/Units scrolls again
		▼	TUE.1	NO	Tuesday In Period	
		ENTER		NO		Scrolling stops
		▲		YES		Select YES
		ENTER		YES		Changed accepted
		ESCAPE	TUE.1	YES	Tuesday In Period	Item/Value/Units scrolls again
		▼	WED.1	NO	Wednesday In Period	
		ENTER		NO		Scrolling stops
		▲		YES		Select YES
		ENTER		YES		Changed accepted
		ESCAPE	WED.1	YES	Wednesday In Period	Item/Value/Units scrolls again
		▼	THU.1	NO	Thursday In Period	
		ENTER		NO		Scrolling stops
		▲		YES		Select YES
		ENTER		YES		Changed accepted
		ESCAPE	THU.1	YES	Thursday In Period	Item/Value/Units scrolls again
		▼	FRI.1	NO	Friday In Period	
		ENTER		NO		Scrolling stops
		▲		YES		Select YES
		ENTER		YES		Changed accepted
		ESCAPE	FRI.1	YES	Friday In Period	Item/Value/Units scrolls again
		ESCAPE				
		ESCAPE				

Table 20 — "Operating Modes" Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	COMMENT
SYS				Item expansion changes as a function of system status
HVAC				Item expansion changes as a function of the HVAC status.

Table 21 — "Alarms" Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	ITEM EXPANSION	COMMENT
CURR	ENTER	AXXX or TXXX	Currently Active Alarms	Alarms are shown as AXXX Alerts are shown as TXXX
R.CUR	ENTER	YES/NO	Reset All Current Alarms	
HIST	ENTER	AXXX or TXXX	Alarm History	Alarms are shown as AXXX Alerts are shown as TXXX
R.HIS	ENTER	YES/NO	Reset Alarm History	

Table 22 — Example of Reading and Clearing Alarms

SUBMODE	KEYPAD ENTRY	ITEM	ITEM EXPANSION	COMMENT
CURR	ENTER	AXXX or TXXX		Active Alarms (AXXX) or Alerts (TXXX) displayed
CURR	ESCAPE			
R.CUR	▼	NO		Use to clear active alarms/alerts
	ENTER	NO		NO Flashes
	▲	YES		Select YES
	ENTER	NO		Alarms/alerts clear, YES changes to NO

The FANS submode is used to test the IDF, IDFP, OFC.1, OFC.2 and OFC.3 variables. The IDF variable is used to force the IGC to turn on the indoor fan (48HG units only). The IGC closes a relay, which then supplies power to the IDFP relay. On 50HG units, the PL3 is jumpered by simulating a permanently closed IGC relay. The indoor fan power relay then is energized to close the IDF contactor. If IDFP is off, the indoor fan cannot operate. This enables the software to turn off the indoor fan power immediately, even if an IGC is installed.

The COOL submode is used to test the compressors. In this mode, the user can turn on any combination of the three compressors. The software will stagger the compressor start-ups by 15 seconds. During Service Test, the compressor minimum off time is 30 seconds. While the compressors operate, the software will control the indoor and outdoor fans as necessary to maintain safe unit operation. All safeties are monitored while the compressors operate and the safeties will turn a compressor, circuit or the unit off if required. If a compressor shuts down because of a safety, the software will set the compressor request (A1, B1 or C1) to OFF, forcing the user to reselect the compressor to restart the compressor in Service mode. All other menus are available during Service Test, enabling the user to watch temperatures and pressures while the compressors operate in Service mode.

In the HEAT submode, TB4-1 (R) must be connected to TB4-4 (W1) in order to operate the heaters. If the control mode is Thermostat Mode, remove the jumper after leaving Service Test mode.

All outputs are turned off when the software transitions from TEST mode to NORMAL mode. To return to NORMAL mode, set TEST to OFF.

OPERATION

Unit Control Type (U.CTL) — The control method is determined by Unit Control Type, which can be found in UNIT, a submode of Configuration. There are three available options that can be set from the Scrolling Marquee.

1. Auto (U.CTL = 1) — This mode selects the active mode by evaluating the devices connected to the unit. If a valid space temperature probe is connected to the unit, the unit will operate in Space Sensor mode. If not, the unit will operate in Thermostat mode.
2. Thermostat (U.CTL = 2) — The unit determines cooling and heating demand by the state of G, Y1, Y2, W1 and W2.
3. Space Sensor (U.CTL = 3) — The unit determines cooling or heating demand based on the space temperature and the appropriate set point.

The available set points are Occupied Cool Set Point (OCSP), Unoccupied Cool Set Point (UCSP), Occupied Heat Set Point (OHSP), and Unoccupied Heat Set Point (UHSP). The occupied or unoccupied heating set point should always be a minimum of 5 F below the corresponding cooling set point. This ensures that the unit does not switch from cooling to heating unnecessarily. The cooling and heating set point deadband can be changed (HC.SP).

Occupancy Determination (SCN.N) — The SCN.N submode, a submode of Time Clock, determines the occupancy.

- SCH.N = 0: The unit is always considered occupied and the programmed schedule is ignored.
- SCN.N = 1-64: Follow the local programmed schedule. Schedules 1-64 are local within the controller. The Centurion unit can only store one local schedule and therefore changing this number only changes the title of the schedule table.
- SCH.N = 65-99: Follow the global programmed schedule. If the Centurion unit is configured as a Global Schedule broadcaster, the unit will follow the unit's programmed schedule and broadcast the schedule so that other devices programmed to follow this schedule number can. If the Centurion unit is not programmed as a Global Schedule broadcaster, the unit will receive its information from the unit programmed to broadcast this schedule number.

NOTE: The occupancy can also be changed by the user by pushing the override button on a T55 or T56 sensor.

Indoor Fan — The indoor fan is controlled by three independent relays on a 48HG unit. The indoor fan is controlled by two independent relays and a jumper wire on a 50HG unit. The first relay (IDF) energizes the indoor fan. The second relay is located on the IGC of a 48HG unit. There is no second relay on a 50HG unit, a jumper wire is used instead. On 48HG units, the power to the second relay comes from an independent source and therefore the first relay does not have to be closed. However, on 50HG units, the jumper wire receives its power from the first relay and therefore the first relay must be closed to power the jumper wire. When the IGC receives a request from the MBB, the IGC will turn on its relay. It will also close this relay when the IGC senses that the indoor fan should be on for gas heating. This signal (or the signal from the jumper wire on 50HG units) supplies 24 volts to the final relay known as indoor fan power (IDFP). Unless there is a problem, this relay will be closed. However, when the unit needs to shutdown immediately because of a smoke problem, this relay will open immediately. This allows the Centurion unit to turn off the indoor fan immediately even when the IGC is controlling the indoor fan.

In Space Temperature mode, the IDF relay will be on in the following situations. If the unit is in Occupied mode and the indoor fan is configured to always run while occupied (OC.FN = YES), the indoor fan will be ON. If OC.FN equals NO or the unit is unoccupied, the indoor fan will operate only when heating or cooling is necessary.

In Thermostat mode, the IDF relay will be on in the following situations. If G is On, then the IDF will be On. If the unit is in the cool mode, the IDF will be on. If the unit is in the heat mode for a 50HG unit, the IDF will be On. The unit will not turn on the IDF on a 48HG unit while in heat (unless G is On) because the IGC is capable of controlling the indoor fan in this situation.

Outdoor Fans — The operation of the outdoor fans depends on the on/off status and discharge pressure, measured by the condensing temperature thermistors, of each circuit. Depending upon these values, the "fan level" for each circuit will be either 0, 1, or 2 as defined by Table 23. Fan level will increment when the discharge pressure is greater than the "On" level and decrement when the discharge pressure is less than the "Off" level. For example, if the discharge pressure starts at 90 psig for Circuit A, the fan level for Circuit A will be 0. When the pressure rises above 150 psig, the fan level will change from 0 to 1. Later, if the pressure drops below 0 psig, the fan level will return to 0. However, since the pressure cannot drop below 0 once the circuit is level 1, it will remain at least level 1 until the corresponding compressor is turned off.

Depending upon the fan level of each circuit, the unit will control the three outdoor fan contactors as specified in Table 24. If any circuit requires an outdoor fan contactor to be ON, then it will be ON even if another circuit does not require it to be ON. As shown in Fig. 3, OFC1 controls OFM1; OFC2 controls OFM2 (028 only), OFM3, OFM5 (028 only) and OFM6; and OFC3 controls OFM4. For example, if the fan levels for Circuits A and B are 0 and the fan level for Circuit C is 1, OFC1 and OFC3 will be energized.

Economizer — If an economizer is installed, then Economizer Equipped configuration should be set to YES (EC.EQ). If the indoor fan is off or the building is unoccupied, the economizer position is zero. If the unit is heating or cooling when the economizer cannot provide free cooling, the economizer position is the Economizer Min Position (MIN.P) or the position specified by the IAQ algorithm.

In cooling, the economizer will be allowed to help with cooling if the outdoor air temperature (OAT) is less than the economizer high temperature lockout (ECL.H). If an enthalpy sensor is installed, the outdoor temperature must be below the economizer high temperature lockout temperature and enthalpy must be low. If the outdoor temperature is less than economizer low temperature lockout (ECL.L), the economizer will not provide free cooling.

If the unit is in cooling, operating under thermostat control, Y1 = ON, and the economizer is available for cooling, the economizer will control the supply air temperature to the low cool set point (LCSP). When Y2 = ON, the economizer will control the supply air temperature to high cool set point (HCSP).

If the unit is in cooling, operating under space temperature control, the economizer is available for cooling, and no compressors are operating, the economizer will control the SAT to either LCSP or HCSP (see Table 25). If a compressor is ON, the economizer will try to position itself at 100%.

If at any time there is a low suction pressure problem while the economizer is cooling, the maximum allowable economizer position will be reduced. The maximum values are 50, 25 and 0% for circuits A, B and C respectively. The maximum value will remain in effect until the compressor "in trouble" turns off. The effective maximum economizer position must always be higher than the current minimum position.

Table 23 — Outdoor Fan Level Transitions

FAN LEVEL	CIRCUIT (PRESSURE) (psig)		
	A	B	C
Lev1Off	0	0	0
Lev1On	150	150	150
Lev2Off	100	100	100
Lev2On	200	200	200

Table 24 — Fan Level Control of Outdoor Fan Contactors (1,2,3)

FAN LEVEL	CIRCUIT		
	A	B	C
0	—	—	—
1	1	3	1, 3
2	1, 2	2, 3	1, 2, 3

Table 25 — LCSP and HCSP Transitions for Space Temperature Mode

CURRENT SAT SET POINT	COOL DEMAND (ΔF)	NEXT SAT SET POINT
LCSP	>0.5	HCSP
HCSP	<0	LCSP
LCSP	<–0.5	Exit Cooling

LEGEND

SAT — Supply-Air Temperature

Indoor Air Quality (IAQ) — On the Centurion unit, indoor air quality (IAQ) is measured using a CO_2 sensor whose measurements are displayed in parts per million (PPM). The IAQ sensor can be field- or factory-installed in the return duct. If IAQ must be measured directly in the space instead of the unit return, a wall-mounted accessory can be field installed.

The Centurion unit's indoor air quality algorithm modulates the position of the economizer damper between two user configurations depending upon the relationship between the IAQ and the Outdoor Air Quality (OAQ). The lower of these two positions is referred to as the Minimum IAQ Damper Position (AQ.MP) while the higher is referred as Economizer Minimum Position (MIN.P). The AQ.MP should be set to an economizer position that brings in enough fresh air to remove contaminants and CO_2 generated by sources other than people. The MIN.P should be set to an economizer position that brings in enough fresh air to remove contaminants and CO_2 generated by all sources including people. The MIN.P value is the design value for maximum occupancy.

The *Comfort*Link™ control will begin to open the damper from the AQ.MP position when the IAQ level begins to exceed the OAQ level by a configurable amount, which is referred to as AQ Differential Low (AQD.L). If OAQ is not being measured, OAQ will be assumed to equal 400 PPM. When the differential between IAQ and OAQ reaches AQ Differential High (AQD.H), the economizer position will be MIN.P. When the IAQ/OAQ differential is between AQD.L and AQD.H, the control will modulate the damper between AQ.MP and MIN.P in a linear manner as shown in Fig. 12 below. The damper position will never exceed the bounds specified by AQ.MP and MIN.P during IAQ control. If the building is occupied and the indoor fan is running and the differential between IAQ and OAQ is less than AQD.L, the economizer will remain at AQ.MP. The economizer will not close completely. The damper position will be 0 when the fan is not running or the building is unoccupied. The damper position may exceed MIN.P in order to provide free cooling.

The *Comfort*Link control is configured for air quality sensors which provide 4 mA at 0 PPM and 20 mA at 2000 PPM. If a sensor has a different range, these bounds must be reconfigured. The values for I.4M, I.20M, O.4M and O.20M on the display represent the PPM corresponding to 4 mA and 20 mA for IAQ and OAQ, respectively.

If OAQ exceeds the OAQ Lockout Value (OAQ.L), the economizer will remain at AQ.MP.

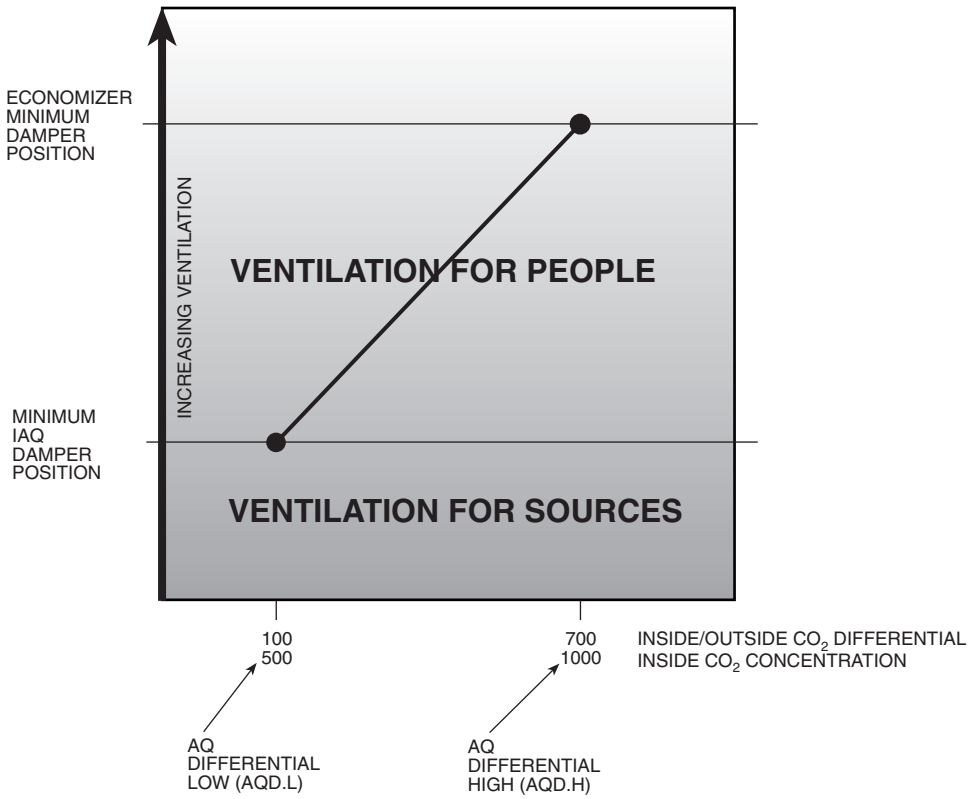


Fig. 12 — IAQ Control

Power Exhaust — To enable power exhaust, PE.EN must be set to YES. If power exhaust is enabled, Power Exhaust 1 will turn on when the economizer position is greater than PE1.P. If power exhaust is enabled, Power Exhaust 2 will turn on when the economizer position is greater than PE2.P. There are small time delays to ensure that rapid cycling does not occur.

Compressor Staging — The electronic controls determine the number of cooling stages needed at any given time as specified in the Cooling section. However, which specific cooling stage operates at any given time depends on compressor staging order and compressor status.

COMPRESSOR STAGING ORDER — The 48/50HG016-024 units have three stages of cooling (Circuits A, B and C). The 48/50HG014 and 028 units have two stages of cooling (Circuits A and B). The position of the evaporators for Circuits A, B and C are bottom, middle and top (see Fig. 4) for a 3-circuit unit. The position of the evaporators is bottom and top for Circuits A and B on a 2-circuit unit. Depending on conditions listed below, circuits will either stage from the bottom evaporator to the top evaporator (BtoT) or from the top evaporator to the bottom evaporator (TtoB). When the unit is staging TtoB, the unit is stated to be inverted.

If inverting is not allowed as determined by the configuration (INV.E = NO), the unit will always stage BtoT. However, if INV.E = YES, then the unit will invert if the outdoor temperature as measured by OAT is greater than 80 F for 15 minutes continuously. Inverting will continue until either INV.E is set to NO or the OAT drops below 75 F for 1 minute.

COMPRESSOR STATUS — Having determined whether staging will occur as either BtoT or TtoB, the unit controls will determine the final order of compressor staging. If all circuits are functioning properly, the compressor staging will always follow either BtoT or TtoB. Therefore if the staging method is BtoT, then Circuit A must turn On before Circuit B and Circuit B before Circuit C. Likewise when removing stages, the stages must be removed in the opposite order. In all cases, the minimum on-time of 3 minutes (MRT.C) and the minimum off-time of 5 minutes (MOT.C) must be honored. Therefore, if the staging order is BtoT and Circuit A was shut down two minutes previously, no circuits will turn on until the minimum off-time for Circuit A has expired; no matter how many circuits are requested.

The rules are different if a circuit has shutdown because of an alarm such as low refrigerant pressure. When a circuit is unavailable because it is not functioning properly, it will be replaced immediately by another circuit. Therefore, if Circuit A and B are operating because two circuits have been requested, the staging is BtoT, and then Circuit A shuts down because of low refrigerant pressure, the control will turn off Circuit A and replace it with Circuit C. Later if Circuit A is allowed to restart (see Alarm Handling on page 28) and BtoT is still active with two requested stages, Circuit A will attempt to restart. If Circuit A has run for 1 minute without sensing any problems, it will be deemed acceptable, causing Circuit C to shutdown. Circuit C will shut down because only two circuits are needed and Circuit A and B are functioning properly.

Heating (48HG Units)

NOTE: THE 48HG units have 2 stages of heat.

For 48HG units, the heat type will automatically be set to 1 for gas units (HT.TY). Heat will not operate if the outdoor temperature is greater than the heat lockout temp (HT.LO).

THERMOSTAT CONTROL — When the thermostat calls for heating, the MBB senses that W1 is On and closes the HTR.1 relay. When the relay is closed, it sends power to W on the IGC (integrated gas unit controller) board. An LED (light-emitting diode) on the IGC board will be on during normal operation. A check is made to ensure that the rollout switch and limit switch are closed. The induced-draft motor is then energized. When speed is proven with the Hall Effect sensor on the motor, the ignition activation period begins.

The burners will ignite within 5 seconds. If the burners do not light, there is a 22-second delay before another 5-second attempt. If the burners still do not light, this sequence is repeated for 15 minutes. After the 15 minutes have elapsed, if the burners still have not ignited, heating is locked out. The control will reset when the request for heat is temporarily removed.

When ignition occurs, the IGC board will continue to monitor the condition of the rollout switch, limit switches, Hall Effect sensor, and the flame sensor. If the unit is controlled through a room thermostat set for fan auto, 45 seconds after ignition occurs the indoor-fan motor will be energized (and the outdoor-air dampers will open to their minimum position). If for some reason the overtemperature limit opens prior to the start of the indoor fan blower, on the next attempt, the 45-second delay will be shortened to 5 seconds less than the time from initiation of heat to when the limit tripped. Gas will not be interrupted to the burners and heating will continue. Once modified, the fan on delay will not change back to 45 seconds unless power is reset to the control.

When additional heat is required and the MBB senses that W2 is On, the MBB closes the HTR.2 relay and sends power to the second stage of the main gas valve. If the thermostat removes the call for W2, the unit will turn off HTR.2 (minimum on-time 2 minutes [MRT.H], minimum off-time 2 minutes [MOT.H]). If W1 is satisfied, the main base board will open HTR.1 (minimum on-time 2 minutes and minimum off-time 2 minutes), interrupting the flow of gas to the main burners. The IGC also has a minimum on-time of 1 minute. Therefore, in modes such as Service Test where the long minimum on-time and off-times are not enforced, the one minute minimum on-time for the IGC will still be followed. If the unit is controlled through a room thermostat set for fan auto, the indoor-fan motor will continue to operate for an additional 45 seconds then stop. If the overtemperature limit opens after the indoor motor is stopped within 10 minutes of W becoming inactive, on the next cycle the time will be extended by 15 seconds. The maximum delay is 3 minutes. Once modified, the fan off delay will not change back to 45 seconds unless power is reset to the control.

An LED indicator is provided on the IGC to monitor operation. The IGC is located by removing the heat section side panel. See Fig. 4. During normal operation, the LED is continuously on. See Table 26 for error codes.

If the user has selected Adaptive (see Cooling section) for its thermostat mode, the algorithm will follow the configurable delays for adding and removing stages. When adding additional heat stages, the delay is measured from when the last stage was added (H.INC). When removing stages, the delay is measured from when the last stage was removed (H.DEC). Therefore, if W1 and W2 turn on simultaneously, the second stage will turn on after a H.INC delay.

NOTE: If the mode is not Adaptive, then there are no delays for adding and removing stages.

SPACE SENSOR CONTROL — During Space Sensor control, the electronic control uses information from the space sensor to determine the number of heat stages. Once the number of stages needed for heating is determined, this information is passed to the IGC by turning on either HTR.1 or HTR.1 and HTR.2. See Thermostat Control section for description of IGC operation.

NOTE: The jumper wire in the installer's packer must be connected between R and W1 when using a T56 device. See Fig. 11.

During Space Sensor control, two methods are used to add stages of heat and two methods are used to subtract stages of heat. The first method of adding and subtracting stages causes

the unit to operate around its configured steady state number of stages. For example, if the correct number of stages is between 0 and 1, this method will cause the first stage to cycle. If the correct number of stages is between 1 and 2, this method will cause the second stage to cycle.

The second method of adding and subtracting stages causes the unit to find the steady state number of stages. The first method will not add or remove a stage of heating unless the current Heat Demand (set point – SPT), corrected by the rate of change in the Heat Demand, is greater than Heat Demand Positive Level (HT.PD) or less than Heat Demand Negative Level (HT.ND). The correction term is the Heat Thermal Lag (H.LAG) multiplied by the change in the Heat Demand. Therefore, if the corrected current demand is in between –1.0 and 1.0, the number of stages will not change no matter how long there has been a positive error. Because the correct heat demand incorporates the rate of change in heat demand, it will have a tendency to add or remove stages earlier when the temperature in the space is moving very rapidly, thereby reducing overshoot.

Because the first method of adding or removing a stage of heat is used to operate around the steady number of stages, this method can not be used to add an additional stage until a stage has been subtracted. Likewise, if this method has subtracted a stage, it can not be used again to subtract another stage until a stage has been added.

The second method will add additional stages of heat whenever Heat Demand is greater than HT.PD + 0.5 and the heat demand is increasing at rate greater than 0.3 F/min. Additional stages of heat will be removed whenever the Heat Demand is less than HT.ND – 0.5 and the heat demand is decreasing at rate less than 0.3 F/min.

Table 26 — IGC LED Indications

ERROR CODE	LED INDICATION
Normal Operation	On
Hardware Failure	Off
Fan On/Off Delay Modified	1 Flash
Limit Switch Fault	2 Flashes
Flame Sense Fault	3 Flashes
Five Consecutive Limit Switch Faults	4 Flashes
Ignition Lockout Fault	5 Flashes
Inducer Switch Fault	6 Flashes
Rollout Switch Fault	7 Flashes
Internal Control Fault	8 Flashes
Software Lockout	9 Flashes

LEGEND

IGC — Integrated Gas Unit Controller
LED — Light-Emitting Diode

NOTES:
1. There is a 3-second pause between error code displays.
2. If more than one error code exists, all applicable error codes will be displayed in numerical sequence.
3. Error codes on the IGC will be lost if power to the unit is interrupted.

Heating (50HG Units)

NOTE: THE 50HG units have 2 stages of heat.

For 50HG units, the heat type will automatically be set to 2 for electric heat units if the electric heat was installed in the factory (HT.TY). If electric heat is being installed in the field, the user must change HT.TY from 0 to 2.

Heat will not operate if the outdoor temperature is greater than the heat lockout temperature (HT.LO).

THERMOSTAT CONTROL — The first stage of electric heat (HTR.1) will follow the W1 input and the second stage (HTR.2) of heat will follow the W2 input. During auto fan, the indoor fan will follow the HTR.1 output. During continuous fan, the indoor fan will follow the G input.

If the user has selected Adaptive (see Cooling section) for thermostat mode, the algorithm will follow the configurable delays for adding and removing stages. When adding additional heat stages, the delay is measured from when the last stage was added (H.INC). When removing stages, the delay is measured from when the last stage was removed (H.DEC). Therefore, if W1 and W2 turn on simultaneously, the second stage will turn on after a H.INC delay.

NOTE: If the mode is not Adaptive, then there are no delays for adding and removing stages.

SPACE SENSOR CONTROL — During Space Sensor control, the electronic control uses information from the space sensor to determine the number of heat stages. Once, the number of stages needed for heating is determined, either HTR.1 or W1 and W2 outputs will be turned on. See Space Sensor Control section for 48HG units.

NOTE: The jumper wire in the installer's packer must be connected between R and W1 when using a T56 device. See Fig. 11.

Cooling — If the outdoor temperature is less than the Compressor Lockout Temperature (MC.LO), then compressors will not operate.

THERMOSTAT CONTROL — There are three types of thermostat control as defined by thermostat control type (T.CTL): 0 is referred to as Adaptive control, 1 is referred to as 1-stage Y1, and 2 as 2-stage Y1. The preferred method of control is Adaptive.

For both 1-stage Y1 and 2-stage Y1 control methods, the adaptive control method is used whenever the economizer can provide cooling, regardless of the selected control method. This will ensure proper time delays and SAT control when the economizer is cooling. If the economizer cannot provide cooling, then the 1-stage Y1 and 2-stage Y1 control methods follow the thermostat inputs directly.

On two-compressor units (size 014 and 028 units), the 1-stage Y1 and 2-stage Y1 control methods are identical and the compressor outputs follow the thermostat inputs directly, obeying the compressor minimum on-time (MRT.C) and minimum off-time (MOT.C) (equal to 3 and 5 minutes, respectively).

For 3-compressor units (size 016 to 024 units), Y1 will turn on one stage when configured for 1-stage Y1, and two stages when configured for 2-stage Y1. When Y2 is On, all three stages will operate. The compressor must follow the minimum on- and off-time requirements. If multiple compressor are requested on or off simultaneously, the compressors will be staged at a 5-second interval.

In Adaptive mode, thermostat cooling begins when the Y1 input is energized. If the economizer is available for cooling, the economizer will try to provide cooling as discussed in the Economizer section. If the economizer is not available for cooling or the economizer has been at 100% for 5 minutes, compressor staging will begin when Y1 is energized.

For size 014 and 028 units, the compressor stages will follow the Y1 and Y2 inputs directly with a configurable delay when adding stages (C.INC) and when removing stages (C.DEC). Therefore, if Y1 and Y2 turn on simultaneously, the second stage will turn on after a C.INC delay. In Adaptive mode, a stage of compression cannot be turned on if the Supply Air Temperature (SAT) is less than Minimum Supply Air Temperature Upper Level (MIN.H). In addition, a stage of compression will be removed if SAT is less than the Minimum Supply Air Temperature Lower Level (MIN.L). If MIN.H and MIN.L are configured so that they are close together, the last stage of compressor will cycle rapidly, slowed only by its minimum on- and off-time requirements.

For size 016 to 024 units, the algorithm must decide how to map a two-stage thermostat to three stages of compression. The staging algorithm uses information from Y1, Y2, and the supply-air temperature to determine the number of stages. If Y1 = OFF, then no compressors will operate unless they are being forced to run in order to status their minimum on-time. If Y1 = ON, then either 1 or 2 stages will operate. Finally, if Y2 = ON, then after the C.INC delay times, the maximum number of stages will operate. When only Y1 is ON, the unit will decide to operate 1 or 2 stages of compression using the following logic. When Y1 turns ON, the first stage of compressor will turn on immediately. The algorithms begin to count the number of seconds since the last change in the number of compressors (in this case, from 0 to 1). After the compressor settling time (SAT.T) is reached, a reference value for SAT is stored. If, while operating with only one compressor on, the return temperature begins to rise, and therefore the SAT temperature rises also, the second compressor will be added when SAT is greater the SAT reference plus SAT positive demand (SA.PD). After the second compressor has been added, another SAT reference value will be taken. The second stage will be turned off when SAT is less than SAT reference plus SAT negative demand (SA.ND). If at anytime Y2 is turned ON, then the algorithm would immediately try to reach 3 stages following the C.INC requirement. If Y1 turns OFF, then all the compressors will turn off after their minimum on-time has been met.

If fan request G is energized, but Y1 is not energized, the indoor fan will operate and the economizer position will be maintained at MIN.P.

SPACE SENSOR CONTROL — To operate the unit in Space Sensor mode, Unit Control Type must be set to Space Sensor (3) and a wire must be added between R and W1 on TB4. See Fig. 11.

While in space sensor control mode, the unit tries to maintain the Space Temperature (SPT) at one of 4 different set points: the Occupied Cool Set Point (OCSP), the Unoccupied Cool Set Point (UCSP), the Occupied Heat Set Point (OHSP), or the Unoccupied Heat Set Point (UHSP). The building's occupancy is affected by a number of different factors. See Occupancy Determination section on page 24. When the building is occupied, the occupied set points are active. When the building is unoccupied, the unoccupied set points are active.

Because Space Sensor mode is an "Auto" mode, the control will switch between cooling and heating to maintain temperature. However, to minimize unnecessary cool to heat and heat to cool changes, there is a 10-minute delay after the last stage turns off before the control will switch modes.

To maintain temperature while cooling, the unit will turn on compressors as needed when the economizer is either unavailable or not providing enough cooling. Information from the space sensor and the supply temperature sensor is used to determine the number of necessary stages. The minimum on-time for each compressor is 3 minutes (MRT.C). The minimum off-time is 5 minutes (MOT.C).

Because the unit contains 3 compressors, each with its own circuit, there are 3 stages of cooling (the economizer is not considered a stage of cooling even though it can provide cooling in certain situations). In general, the minimum time between increasing stages is a configurable delay (C.INC). The minimum time between decreasing stages is a configurable delay (C.DEC).

The unit will request a stage of cooling whenever the Cool Demand (SPT – set point) is greater than the SPT Cool Demand Positive Level (CL.PD) plus the change in Cool Demand times the Cool Thermal Lag (C.LAG).

Consider the following values: Cool Demand = 0.9, change in Cool Demand = 0.2, Cool Thermal Lag = 1.0, and Cool Demand Positive Level = 1.0. Because 0.9 + 0.2*1.0 is greater than 1.0, a stage of cooling would be added. This method of adding a stage can only be used after the compressor settling time has expired (SAT.T) and trend in SAT is increasing or slowly decreasing. This method of adding a stage of cooling can not be used again until a stage of cooling has been removed. Additional stages of cooling can be added whenever Cool Demand is greater than CL.PD + 0.5 and the SAT is increasing at rate greater than –0.2 F/min.

The unit will remove a stage of cooling whenever the Cool Demand (SPT – set point) is less than the SPT Cool Demand Negative Level (CL.ND) plus the change in Cool Demand times the Cool Thermal Lag (C.LAG). Consider the following values: Cool Demand = –0.9, change in Cool Demand = –0.2, Cool Thermal Lag = 1.0, and Cool Demand Negative Level = –1.0. Because –0.9 + –0.2*1.0 is less than –1.0, a stage of cooling would be removed. This method of removing a stage can only be used after the compressor settling time has expired (SAT.T) and the trend in SAT is decreasing or slowly increasing. This method of removing a stage of cooling cannot be used again until a stage of cooling has been added. Additional stages of cooling can be removed whenever the Cool – Demand is less than CL.ND –0.5 and the SAT is increasing at rate greater than –0.2 F/min.

Alarm Handling — There are a variety of different alerts and alarms in the system. Alerts are indicated by TXXX (where XXX is the alert number) on the display and signify that the improperly functioning circuit can restart without human interaction. If an alarm occurs, indicated by AXXX (where XXX is the alarm number), the damaged circuit will not restart without an alarm reset via the Scrolling Marquee display.

The response of the control system to various alerts and alarms depends on the seriousness of the particular alert or alarm. In the mildest case, an alert does not affect the operation of the unit in any manner. An alert can also cause a "strike." A "striking" alert will cause the circuit to shut down for 15 minutes. This feature reduces the likelihood of false alarms causing a properly working system to be shutdown incorrectly. If three strikes occur before the circuit has an opportunity to show that it can function properly, the circuit will strike out, causing the shutdown alarm for that particular circuit. Once activated, the shutdown alarm can only be cleared via an alarm reset.

However, circuits with strikes will be given an opportunity to reset their strike counter to zero. As discussed above, a strike typically causes the circuit to shutdown. Fifteen minutes later, that circuit will once again be allowed to run. If the circuit is able to run for 1 minute, its replacement circuit will be allowed to shut down (if not required to run to satisfy requested stages). However, the "troubled" circuit must run continuously for 5 minutes with no detectable problems before the strike counter will be reset to zero.

Operators with CCN networks might not want to be notified of "striking" alerts until a circuit has been shut down because of three alerts. If the operator sets A.NOW (Alarm Now) to NO, alerts will not be announced until a circuit is permanently shut down. This implies that alarm will not be broadcast on the CCN network or listed on the display until a permanent shutdown alarm occurs.

The status of A.NOW is ignored during Service Test mode because it is presumed that the service technician will want to be notified of any alerts or alarms immediately. So as not to confuse a monitor center, the words "SERVICE TEST" are inserted into every alarm message while the unit is operating in Service Test Mode. The alarm output relay can be configured using the ALARMOUT table via Service Tool. This table allows the user to decide whether or not the alarm output will activate when a particular set of alarms occurs. (See Appendix A, ALARMOUT table.)

TROUBLESHOOTING

The Scrolling Marquee display shows the actual operating conditions of the unit while it is running. If there are alarms or there have been alarms, they will be displayed in either the current alarm list or the history alarm list. See Tables 21 and 27. The Service Test mode allows proper operation of the compressors, fans, and other components to be checked while the unit is not operating. See Service Test on page 11.

Complete Unit Stoppage — There are several conditions that can cause the unit not to provide heating or cooling:

- If an alarm is active which causes the unit to shut down, diagnose the problem using the information provided in Alarms and Alerts section below.
- Cooling and heating loads are satisfied.
- Programmed schedule.
- General power failure.
- Tripped CB1, CB2 or CB3 (24-volt transformer circuit breakers).
- Blown fuse (1 or 2).
- Unit is turned off through the CCN network.
- If unit cannot cool, supply air temperature may be less than variable MIN.L (Default = 48 F).

Single Circuit Stoppage — If a single circuits stops incorrectly, there are several possible causes. The problem should be investigated using information from the alarm list. See Table 27.

Service Analysis — Detailed service analysis can be found in Tables 28 and 29 and in Fig. 13.

Restart Procedure — Before attempting to restart the machine, check the alarm list to determine the cause of the shutdown. If the shutdown alarm for a particular circuit has occurred, determine and correct the cause before allowing the unit to run under its own control again. When there is problem, the unit should be diagnosed in Service Test mode. The alarms must be reset before the circuit can operate in either Normal mode or Service Test mode.

Alarms and Alerts — Alarms and alerts are warnings of abnormal or fault conditions, and may cause either one circuit or the entire unit to shut down. They are assigned code numbers and descriptions as described below. The description for an alarm can be viewed from the Scrolling Marquee display by pressing ESCAPE and ENTER keys simultaneously while displaying the alarm code number. Table 27 contains a detailed description of each alarm and alert code error and possible cause. Possible actions taken by the electronic controls are:

- nothing
- adding a “strike” to the strike counter for a particular circuit
- shutting down a circuit
- shutting down the unit.

When a “strike” is added, the circuit is shut down for 15 minutes. After 3 strikes, the circuit will be permanently shut down until the alarms are reset via the Scrolling Marquee display. More information concerning alarm handling can be found in Alarm Handling on page 28.

DIAGNOSTIC ALARM CODES AND POSSIBLE CAUSES

Alert Codes 51, 55 and 59 (Compressor Fault) — Alert codes 51, 55, and 59 are for compressors A1, B1, and C1, respectively. These alarms occur when the Current Sensor (CS) does not detect compressor current during compressor operation. When this occurs, the control turns off the compressor and logs a strike for the respective circuit. This alert might also occur if the CS detects current when the compressor should be off. Use the Scrolling Marquee to reset the alert.

The possible causes are:

1. High-pressure switch open. The high-pressure switch is wired in series with compressor relays on the MBB. If the high-pressure switch opens during compressor operation, the compressor stops, and the CS no longer detects current, causing the control to activate this alert.
2. Compressor internal protection open.
3. Wiring error. A wiring error might not allow the compressor to start.
4. Welded contactor.

To check out alerts 51, 55 and 59:

1. Turn on the compressor in question using Service Test mode. If the compressor does not start, then most likely the problem is one of the following: HPS (high-pressure switch) open, open internal protection, or incorrect safety or compressor wiring.
2. If the compressor starts, verify that the indoor and outdoor fans are operating properly.
3. If the CS is always detecting current, verify that the compressor is ON. If the compressor is ON, check the contactor and the relay on the MBB. If the compressor is OFF and there is no current, verify CS wiring and replace if necessary.
4. Return to Normal mode and observe compressor operation to verify that compressor current sensor is working and condenser fans are energized after compressor starts.

Alert Codes 64, 65 and 80 (Condensing Temp. Failure) — Alert codes 64, 65, and 80 are for circuits A, B and C, respectively. These alerts occur when the temperature is outside the range –40 to 240 F (–40 to 116 C). When this occurs, the control uses the outdoor temperature to control the outdoor fans. If the outdoor temperature is greater than 40 F, the circuit will run at Fan Level 2. If the outdoor temperature is less than 35 F, the circuits will run at Fan Level 1. If the outdoor-air humidity is also bad, the circuit will be locked out, otherwise this alert resets automatically.

The cause of the alert is usually a faulty thermistor, a shorted or open thermistor caused by a wiring error, or a loose connection.

Alert Code 73 (Outside Air Temp. Failure) — This alert occurs when the temperature is outside the range –40 to 240 F (–40 to 116 C). This alert resets automatically. The cause of the alert is usually a faulty thermistor, a shorted or open thermistor caused by a wiring error, or a loose connection.

Alert Code 74 (Space Temp. Failure) — This alert occurs when the temperature is outside the range –40 to 240 F (–40 to 116 C). This alert will only occur if the unit is in Space Sensor Mode. The unit will shut down if this alert occurs while in Space Sensor mode. This alert resets automatically. The cause of the alert is usually a faulty thermistor in the T55 or T56 device, a shorted or open thermistor caused by a wiring error, or a loose connection.

Alert Code 75 (Supply Air Temp. Failure) — This alert occurs when the temperature is outside the range –40 to 240 F (–40 to 116 C). Use the Scrolling Marquee to reset the alert. The cause of the alert is usually a faulty thermistor, a shorted or open thermistor caused by a wiring error, or a loose connection.

Alert Code 80 (Condensing Temp. Failure) — See Alert 64.

Alert Codes 92, 93, 101 (Suction Pres. Trans. Failure) — Alert codes 92, 93, and 101 are for circuits A, B and C, respectively. This alert occurs when the pressure is outside the range 0.5 to 134.5 psig. A circuit cannot run when this alert is active. Use the Scrolling Marquee to reset the alarm. The cause of the alert is usually a faulty transducer, faulty 5-V power supply, or a loose connection.

Alert Codes 102, 103, 104 (Current Sensor Failure) — Alert codes 102, 103, and 104 are for compressors A1, B1, and C1, respectively. This alert occurs when the output of the current sensor is a constant high value. The alert resets automatically. The cause of the alert is a wiring error or a loose connection. If the problem cannot be resolved and the CS board must be replaced, the CS board can be temporarily disabled while securing a replacing board. A CS board is disabled by setting the corresponding configuration to DISABLE (CS.A1, CS.B1 or CS.C1).

Alert Codes 110, 111, 140 (Loss of Charge) — Alert codes 110, 111, and 140 are for circuits A, B and C, respectively. This alert occurs when the compressor is off and the suction pressure < 5 psig and OAT > –5 F for 1 continuous minute. Use the Scrolling Marquee to reset the alert. The cause of the alert is usually low refrigerant pressure or a faulty suction pressure. These alerts only occur when the compressor is off because the low refrigerant pressure alarms (alerts 133, 134 and 141) handle this situation when the compressor is operating.

Alert Codes 126, 127, 142 (High Refrigerant Pressure) — Alert codes 126, 127, and 142 are for circuits A, B, and C, respectively. These alerts occur when alerts 51, 55, or 59 are active while the appropriate condensing temperature is greater than 150 F. Use the Scrolling Marquee to reset the alert. The cause of the alarm is usually an overcharged system, high outdoor ambient temperature coupled with dirty outdoor coil, plugged filter drier, or a faulty high pressure switch. See Alerts 51, 55 and 59 for diagnostic procedure.

Alert Codes 133, 134, 141 (Low Refrigerant Pressure) — Alert codes 133, 134, and 141 are for circuits A, B and C, respectively. These alerts occur when the compressor is operating and the evaporating temperature (converted from the suction pressure) is less than 20 F for 5 minutes, 15 F for 3 minutes, or 10 F for 1.5 minutes. When the outdoor temperature is less than 40 F, the above values are reduced by an offset that scales between 0 and 10 as the outdoor temperature goes from 40 to 0° F. These alerts cause a strike for the respective circuit. These alerts will activate when the coil becomes frosted. However, during the 15-minute reset period, the coils will thaw and strike should clear at restart if there is nothing else wrong with the circuit. The alert resets automatically. The cause of the alert is usually low refrigerant charge, dirty filters, evaporator fan operating backwards, loose or broken belt, plugged filter drier, faulty transducer, excessively cold return air, or stuck open economizer when the ambient temperature is low.

Alert Code 140 (Loss of Charge) — See Alert 110.

Alert Code 141 (Low Refrigerant Pressure) — See Alert 133.

Alert Code 142 (High Refrigerant Pressure) — See Alert 126.

Alert Codes 143, 144, 145 (Failure to Pressurize) — Alert codes 143, 144, and 145 are for circuits A, B, and C, respectively. This alert occurs when the compressor turns on and the suction pressure does not drop 5 psig during the first 15 seconds and the condensing temperature does not rise 5 F during the first minute. These alerts cause a strike for the respective circuit. The alert resets automatically. The cause of the alert is usually compressor wiring causing reverse rotation or a faulty compressor.

Alarm Codes 163, 164, 165 (Circuit Failure) — Alarm codes 163, 164, and 165 are for circuits A, B, and C, respectively. This alarm occurs when a circuit has 3 strikes. Use the Scrolling Marquee display to reset the alarm. Investigate the alarm that caused the strikes to occur.

Alert Code 179 (Com. Failure with ECB) — This alert occurs when the MBB cannot communicate with the ECB. This is usually caused by a wiring problem. Investigate using the Low Voltage Schematic.

Alert Codes 180 (Com. Failure with Economizer Actuator) — This alert occurs when the MBB cannot communicate with the Belimo Actuator. This is usually caused by a wiring problem. Investigate using the Low Voltage Schematic.

Alarm Code 404 (Fire Shutdown) — This alarm occurs when the Shutdown Input is either open or closed depending upon its configuration. This alarm is usually caused by an auxiliary device that is trying to shut down the unit, e.g. smoke detector. The configuration for this switch input can be found at variable FS.SW. Verify that the configuration is set correct, verify the wiring and auxiliary device. This alarm resets automatically.

Alert Code 408 (Dirty Air Filter) — This alert occurs when the Filter Status switch senses a plugged filter for 120 continuous seconds after the indoor fan has been running for 10 seconds. Because the Dirty Air Filter switch can be configured normally opened or closed, the switch might be open or closed. The configuration for this switch input can be found at variable FL.SW. Verify that the configuration is set correct, verify the wiring and fan status switch. The hose should be connected to the low side of the switch. This alert resets automatically.

Alert Code 409 (Fan Feedback On When Not Expected) — This alert occurs when the Fan Feedback signal has been On for more than 5 seconds yet the Fan Power relay is Off. Verify wiring.

Alert Code 409 (Fan Feedback Off When Not Expected) — This alert occurs when the IDF has been on for more than 15 seconds yet the Fan Feedback is Off. Verify wiring. Compressors will not be allowed to run until this alert clears. Check for errors on the IGC which might have caused the IDF to turn off.

Alert Code 410 (R-W1 Jumper Alarm) — This alert occurs when the control mode is Space Temperature Mode via Auto Select or Space Temp Select yet there is no power to W1. Verify that space temperature mode is the desired mode or add jumper between R and W1. This alert resets automatically.

Alert Code 411 (Y2 without Y1) — This alert occurs in Thermostat mode when Y2 is energized and Y1 is not. Verify thermostat and thermostat wiring. When Y2 turns On, the software will behave as if Y1 and Y2 are both On. When Y2 turns Off, the software will behave as if Y1 and Y2 are both Off. This alert resets automatically when Y1 is turned On.

Alert Code 412 (W2 without W1) — This alert occurs in Thermostat mode when W2 is energized and W1 is not. Verify thermostat and thermostat wiring. When W2 turns On, the software will behave as if W1 and W2 are both On. When W2 turns Off, the software will behave as if W1 and W2 are both Off. This alert resets automatically when W1 is turned On.

Alert Code 413 (Y and W Simultaneously) — This alert occurs in Thermostat mode when Y1 or Y2 is energized simultaneously with W1 or W2. Verify thermostat and thermostat wiring. The software will enter either the cooling or heating mode depending upon which input turned on first. This alert resets automatically when Y1 and Y2 are not on simultaneously with W1 and W2.

Table 27 — Alarm Codes

ALARM OR ALERT NUMBER	DESCRIPTION	ACTION TAKEN BY CONTROL	RESET METHOD	PROBABLE CAUSE
T051	Compressor A1 Safety Trip	Add Strike for Circuit A	Automatic	High-pressure switch open. Check for T126 Compressor internal protection open. Wiring error
	Compressor A1 Current Detected After Turnoff	Add Strike for Circuit A	Automatic	Welded contactor
T055	Compressor B1 Safety Trip	Add Strike for Circuit B	Automatic	High-pressure switch open. Check for T127 Compressor internal protection open. Wiring error
	Compressor B1 Current Detected After Turnoff	Add Strike for Circuit B	Automatic	Welded contactor
T059	Compressor C1 Safety Trip	Add Strike for Circuit C	Automatic	High-pressure switch open. Check for T142 Compressor internal protection open. Wiring error
	Compressor C1 Current Detected After Turnoff	Add Strike for Circuit C	Automatic	Welded contactor
T064	Circuit A Saturated Condensing Temp Thermistor Failure	Use OAT to control Outdoor fans	Manual or Automatic	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T065	Circuit B Saturated Condensing Temp Thermistor Failure	Use OAT to control Outdoor fans	Manual or Automatic	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T073	Outdoor Air Temperature Thermistor Failure	—	Automatic	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T074	Space Temperature Thermistor Failure	Unit shutdown	Manual	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T075	Supply Air Temperature Thermistor Failure	—	Manual	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T080	Circuit C Saturated Condensing Temp Thermistor Failure	Use OAT to control Outdoor fans	Manual or Automatic	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T092	Circuit A Suction Pressure Transducer Failure	Shutdown Circuit A	Manual	Faulty transducer, faulty 5-V power supply, or loose connection
T093	Circuit B Suction Pressure Transducer Failure	Shutdown Circuit B	Manual	Faulty transducer, faulty 5-V power supply, or loose connection
T101	Circuit C Suction Pressure Transducer Failure	Shutdown Circuit C	Manual	Faulty transducer, faulty 5-V power supply, or loose connection
T102	Compressor A1 Current Sensor Failure	—	Automatic	Faulty current sensor caused by wiring error or loose connection
T103	Compressor B1 Current Sensor Failure	—	Automatic	Faulty current sensor caused by wiring error or loose connection
T104	Compressor C1 Current Sensor Failure	—	Automatic	Faulty current sensor caused by wiring error or loose connection
T110	Circuit A Loss of Charge	Shutdown Circuit A	Manual	Low refrigerant or faulty suction pressure transducer
T111	Circuit B Loss of Charge	Shutdown Circuit B	Manual	Low refrigerant or faulty suction pressure transducer
T126	Circuit A High Refrigerant Pressure	Shutdown Circuit A	—	An overcharged system, high outdoor ambient temperature coupled with dirty outdoor coil, plugged filter drier, or a faulty high-pressure switch.
T127	Circuit B High Refrigerant Pressure	Shutdown Circuit B	—	An overcharged system, high outdoor ambient temperature coupled with dirty outdoor coil, plugged filter drier, or a faulty high-pressure switch.
T133	Circuit A Low Refrigerant Pressure	Add Strike for Circuit A	Automatic	Low refrigerant charge, dirty filters, evaporator fan turning backwards, loose or broken fan belt, plugged filter drier, faulty transducer, excessively cold return air, or stuck open economizer when the ambient temperature is low.
T134	Circuit B Low Refrigerant Pressure	Add Strike for Circuit B	Automatic	Low refrigerant charge, dirty filters, evaporator fan turning backwards, loose or broken fan belt, plugged filter drier, faulty transducer, excessively cold return air, or stuck open economizer when the ambient temperature is low.
T140	Circuit C Loss of Charge	Shutdown Circuit C	Manual	Low refrigerant or faulty suction pressure transducer
T141	Circuit C Low Refrigerant Pressure	Add Strike for Circuit C	Automatic	Low refrigerant charge, dirty filters, evaporator fan turning backwards, loose or broken fan belt, plugged filter drier, faulty transducer, excessively cold return air, or stuck open economizer when the ambient temperature is low.
T142	Circuit C High Refrigerant Pressure	Shutdown Circuit C	—	An overcharged system, high outdoor ambient temperature coupled with dirty outdoor coil, plugged filter drier, or a faulty high-pressure switch.
T143	Circuit A Failure To Pressurize	Add Strike for Circuit A	Automatic	Wiring causing reverse rotation or faulty compressor
T144	Circuit B Failure To Pressurize	Add Strike for Circuit B	Automatic	Wiring causing reverse rotation or faulty compressor
T145	Circuit C Failure To Pressurize	Add Strike for Circuit C	Automatic	Wiring causing reverse rotation or faulty compressor
A163	Circuit A Down Due to Failure	Shutdown Circuit A	Manual	Circuit has 3 strikes or has been locked out by another alarm
A164	Circuit B Down Due to Failure	Shutdown Circuit B	Manual	Circuit has 3 strikes or has been locked out by another alarm
A165	Circuit C Down Due to Failure	Shutdown Circuit C	Manual	Circuit has 3 strikes or has been locked out by another alarm
T179	Loss of communication with the Economizer Control Board	—	Automatic	Communication wiring problem with ECB or faulty MBB or ECB
T180	Loss of communication with the Economizer Control Board	—	Automatic	Communication wiring problem with actuator.
A404	Fire Shutdown	Unit Shutdown	Automatic	Smoke detected by smoke detector
T408	Dirty Filter	—	Automatic	Dirty Filter
T409	Fan Status Switch On, Contactor Off	If IDF.F = Yes, then Unit Shutdown	If IDF.F = YES, then Automatic, otherwise manual	Bad Fan Status Switch
	Fan Status Switch Off, Contactor On	If IDF.F = Yes, then Unit Shutdown	If IDF.F = YES, then Automatic, otherwise manual	Tripped Circuit Breaker Broken belt. Bad indoor fan motor.
	Fan Feedback On when not Expected	—	Automatic	Bad relay.
	Fan Feedback On when not Expected	Compressors will not operate	Automatic	Bad IGC, wiring problem, or bad MBB relays.
T410	R-W1 Jumper Not Installed in Space Temp Mode	Unable to run heat	Automatic	Missing jumper wire
T411	Thermostat Y2 Input Activated without Y1 Activated	Run unit as if Y2 and Y1 are On	Automatic	Bad Thermostat or Thermostat Wiring
T412	Thermostat W2 Input Activated without W1 Activated	Run unit as if W1 and W1 are On	Automatic	Bad Thermostat or Thermostat Wiring
T413	Thermostat Y and W Inputs Activated Simultaneously	Run unit in mode activated first	Automatic	Bad Thermostat or Thermostat Wiring

LEGEND

ECB — Economizer Control Board
IGC — Integrated Gas Controller
MBB — Main Base Board
OAT — Outdoor-Air Thermistor

Table 28 — Cooling Service Analysis

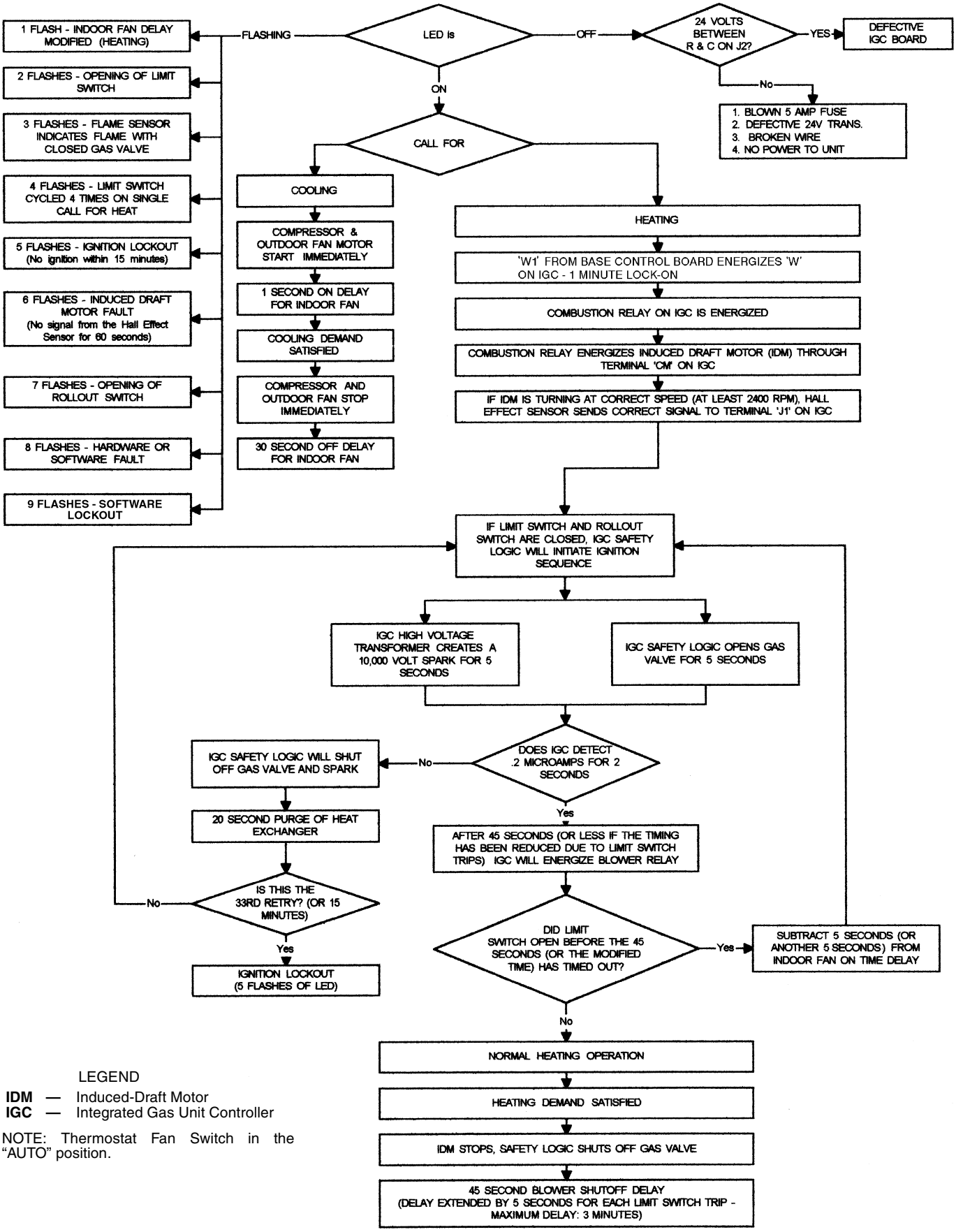
PROBLEM	CAUSE	REMEDY
Compressor and condenser fan will not start.	Power failure.	Call power company.
	Fuse blown or circuit breaker tripped.	Replace fuse or reset circuit breaker.
	Defective thermostat, contactor, transformer, or control relay	Replace component.
	Insufficient line voltage.	Determine cause and correct.
	Incorrect or faulty wiring.	Check wiring diagram and rewire correctly.
	Thermostat setting too high.	Lower thermostat setting below room temperature.
Compressor will not start but condenser fan runs.	Faulty wiring or loose connections in compressor circuit.	Check wiring and repair or replace.
	Compressor motor burned out, seized, or internal overload open	Determine cause. Replace compressor.
	Defective overload.	Determine cause and replace.
	Compressor locked out	Determine cause for safety trip and reset lockout.
	One leg of 3-phase power dead.	Replace fuse or reset circuit breaker. Determine cause.
Compressor cycles (other than normally satisfying thermostat).	Refrigerant overcharge or undercharge.	Recover refrigerant, evacuate system, and recharge to nameplate
	Defective compressor.	Determine cause and replace.
	Insufficient line voltage.	Determine cause and correct.
	Blocked condenser.	Determine cause and correct.
	Defective overload.	Determine cause and replace.
	Defective thermostat.	Replace thermostat.
	Faulty condenser-fan motor	Replace.
	Restriction in refrigerant system.	Locate restriction and remove.
Compressor operates continuously.	Dirty air filter.	Replace filter.
	Unit undersized for load.	Decrease load or increase unit size.
	Thermostat set too low.	Reset thermostat.
	Low refrigerant charge.	Locate leak, repair, and recharge.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser coil dirty or restricted.	Clean coil or remove restriction.
Excessive head pressure.	Dirty air filter.	Replace filter.
	Dirty condenser coil.	Clean coil.
	Refrigerant overcharged.	Recover excess refrigerant.
	Faulty TXV.	1. Check TXV bulb mounting and secure tightly to suction line. 2. Replace TXV if stuck open or closed.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser air restricted or air short-cycling.	Determine cause and correct.
	Restricted filter drier.	Replace filter drier.
Head pressure too low.	Low refrigerant charge.	Check for leaks, repair, and recharge.
Excessive suction pressure.	High heat load.	Check for source and eliminate.
	Faulty TXV.	1. Check TXV bulb mounting and secure tightly to suction line. 2. Replace TXV if stuck open or closed.
	Refrigerant overcharged.	Recover excess refrigerant.
Suction pressure too low.	Dirty air filter.	Replace filter.
	Low refrigerant charge.	Check for leaks, repair, and recharge.
	Metering device or low side restricted.	Remove source of restriction.
	Faulty TXV.	1. Check TXV bulb mounting and secure tightly to suction line. 2. Replace TXV if stuck open or closed.
	Insufficient evaporator airflow.	Increase air quantity. Check filter and replace if necessary
	Temperature too low in conditioned area.	Reset thermostat.

LEGEND

TXV — Thermostatic Expansion Valve

Table 29 — Heating Service Analysis

PROBLEM	CAUSE	REMEDY
Burners will not ignite.	Misaligned spark electrodes.	Check flame ignition and sensor electrode positioning. Adjust as needed.
	No gas at main burners.	Check gas line for air; purge as necessary. After purging gas line of air, allow gas to dissipate for at least 5 minutes before attempting to relight unit.
		Check gas valve.
	Water in gas line.	Drain water and install drip leg to trap water.
	No power to furnace.	Check power supply, fuses, wiring, and circuit breaker.
	No 24 v power supply to control circuit.	Check transformer. Transformers with internal overcurrent protection require a cool-down period before resetting. Check 24-v circuit breaker; reset if necessary.
	Miswired or loose connections.	Check all wiring and wire nut connections.
	Burned-out heat anticipator in thermostat.	Replace thermostat.
	Broken thermostat wires.	Run continuity check. Replace wires if necessary.
Inadequate heating.	Dirty air filter.	Clean or replace filter as necessary.
	Gas input to unit too low.	Check gas pressure at manifold. Clock gas meter for input. If too low, increase manifold pressure or replace with correct orifices.
	Unit undersized for application.	Replace with proper unit or add additional unit.
	Restricted airflow.	Clean filter, replace filter, or remove any restrictions.
	Blower speed too low.	Install alternate motor, if applicable, or adjust pulley to increase fan speed.
	Limit switch cycles main burners.	Check rotation of blower, thermostat heat anticipator settings, and temperature rise of unit. Adjust as needed.
	Too much outdoor air.	Adjust minimum position.
		Check economizer operation.
Poor flame characteristics.	Incomplete combustion (lack of combustion air) results in: Aldehyde odors, CO, sooting flame, or floating flame.	Check all screws around flue outlets and burner compartment. Tighten as necessary.
		Cracked heat exchanger.
		Overfired unit — reduce input, change orifices, or adjust gas line or manifold pressure.
		Check vent for restriction. Clean as necessary.
		Check orifice to burner alignment.
Burners will not turn off.	Unit is locked into Heating mode for a one-minute minimum.	Wait until mandatory one-minute time period has elapsed or cycle power to unit.


1 FLASH - INDOOR FAN DELAY MODIFIED (HEATING)
2 FLASHES - OPENING OF LIMIT SWITCH
3 FLASHES - FLAME SENSOR INDICATES FLAME WITH CLOSED GAS VALVE
4 FLASHES - LIMIT SWITCH CYCLED 4 TIMES ON SINGLE CALL FOR HEAT
5 FLASHES - IGNITION LOCKOUT (No ignition within 15 minutes)
6 FLASHES - INDUCED DRAFT MOTOR FAULT (No signal from the Hall Effect Sensor for 60 seconds)
7 FLASHES - OPENING OF ROLLOUT SWITCH
8 FLASHES - HARDWARE OR SOFTWARE FAULT
9 FLASHES - SOFTWARE LOCKOUT
FLASHING
LED is
OFF
24 VOLTS BETWEEN R & C ON J2?
YES
DEFECTIVE IGC BOARD
No
1. BLOWN 5 AMP FUSE
2. DEFECTIVE 24V TRANS.
3. BROKEN WIRE
4. NO POWER TO UNIT
ON
CALL FOR
COOLING
COMPRESSOR & OUTDOOR FAN MOTOR START IMMEDIATELY
1 SECOND ON DELAY FOR INDOOR FAN
COOLING DEMAND SATISFIED
COMPRESSOR AND OUTDOOR FAN STOP IMMEDIATELY
30 SECOND OFF DELAY FOR INDOOR FAN
HEATING
'W1' FROM BASE CONTROL BOARD ENERGIZES 'W' ON IGC - 1 MINUTE LOCK-ON
COMBUSTION RELAY ON IGC IS ENERGIZED
COMBUSTION RELAY ENERGIZES INDUCED DRAFT MOTOR (IDM) THROUGH TERMINAL 'CM' ON IGC
IF IDM IS TURNING AT CORRECT SPEED (AT LEAST 2400 RPM), HALL EFFECT SENSOR SENDS CORRECT SIGNAL TO TERMINAL 'J1' ON IGC
IF LIMIT SWITCH AND ROLLOUT SWITCH ARE CLOSED, IGC SAFETY LOGIC WILL INITIATE IGNITION SEQUENCE
IGC HIGH VOLTAGE TRANSFORMER CREATES A 10,000 VOLT SPARK FOR 5 SECONDS
IGC SAFETY LOGIC OPENS GAS VALVE FOR 5 SECONDS
DOES IGC DETECT .2 MICROAMPS FOR 2 SECONDS
No
IGC SAFETY LOGIC WILL SHUT OFF GAS VALVE AND SPARK
20 SECOND PURGE OF HEAT EXCHANGER
IS THIS THE 33RD RETRY? (OR 15 MINUTES)
No
Yes
IGNITION LOCKOUT (5 FLASHES OF LED)
Yes
AFTER 45 SECONDS (OR LESS IF THE TIMING HAS BEEN REDUCED DUE TO LIMIT SWITCH TRIPS) IGC WILL ENERGIZE BLOWER RELAY
DID LIMIT SWITCH OPEN BEFORE THE 45 SECONDS (OR THE MODIFIED TIME) HAS TIMED OUT?
Yes
SUBTRACT 5 SECONDS (OR ANOTHER 5 SECONDS) FROM INDOOR FAN ON TIME DELAY
No
NORMAL HEATING OPERATION
HEATING DEMAND SATISFIED
IDM STOPS, SAFETY LOGIC SHUTS OFF GAS VALVE
45 SECOND BLOWER SHUTOFF DELAY (DELAY EXTENDED BY 5 SECONDS FOR EACH LIMIT SWITCH TRIP - MAXIMUM DELAY: 3 MINUTES)

LEGEND

IDM — Induced-Draft Motor
IGC — Integrated Gas Unit Controller

NOTE: Thermostat Fan Switch in the "AUTO" position.

Fig. 13 — IGC Control (Heating and Cooling)

Thermistor Troubleshooting — The electronic control uses five 5K-thermistors (T1 through T5) to sense temperatures used to control operation of the unit. See Fig. 1 or 2. Resistances at various temperatures are listed in Tables 30 and 31. Thermistor pin connection points are shown in Table 2. The locations of the thermistors are shown on Fig. 4. When replacing thermistors T3 through T5, reuse the original hardware. These thermistors must be clamped tightly to the hairpins of the condenser.

The T55 and T56 space temperature sensors use 10K thermistors. Resistances at various temperatures are listed in Tables 32 and 33.

THERMISTOR/TEMPERATURE SENSOR CHECK — A high quality digital volt-ohmmeter is required to perform this check.

1. Connect the digital voltmeter across the appropriate thermistor terminals at the J8 terminal strip on the Main Base Board (see Fig. 1).
2. Using the voltage reading obtained, read the sensor temperature from Tables 30-33.
3. To check thermistor accuracy, measure temperature at probe location with an accurate thermocouple-type temperature-measuring instrument. Insulate thermocouple to avoid ambient temperatures from influencing reading. Temperature measured by thermocouple and temperature determined from thermistor voltage reading should be close, 5 F (3 C) if care was taken in applying thermocouple and taking readings.

If a more accurate check is required, unit must be shut down and thermistor removed and checked at a known temperature (freezing point or boiling point of water) using either voltage drop measured across thermistor at the J8 terminal, or by determining the resistance with unit shut down and thermistor disconnected from J8. Compare the values determined with the value read by the control in the Temperatures mode using the Scrolling Marquee display.

Transducer Troubleshooting — The electronic control uses 3 suction pressure transducers to measure the suction pressure of circuits A, B, and C. The pressure/voltage characteristics of these transducers are in shown in Table 34. The accuracy of these transducers can be verified by connecting an accurate pressure gage to the second refrigerant port in the suction line.

START-UP

IMPORTANT: Do not attempt to start unit, even momentarily, until all items on the Start-Up Checklist (in installation instructions) and the following steps have been completed.

1. Verify unit has been installed per the Installation Instructions included in the unit installation packet.
2. Verify that all auxiliary components (thermostat, sensors, controls, etc.) have been installed and wired to the unit control box per these instructions, the unit Installation instructions, and the unit wiring label diagrams.
3. Set any control configurations that are required (field-installed accessories, etc.). The unit is factory configured for all appropriate factory-installed options with the applicable controls, pre-programmed to the default values. See Table 16 and Table 17 for additional information on setting configurations.
4. Enter unit set points. The unit is shipped with the set point default values. If a different set point is required, change per directions in Table 13.
5. Configure the Occupancy schedule.
6. Verify that the control time periods programmed meet current requirements.
7. Check all electrical connections to be sure that they are tight.
8. Start unit using Service Test mode to verify operation of all major components.

Table 30 — 5K Thermistor Temperature (F) vs Resistance/Voltage

TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
–25	3.699	98,010
–24	3.689	94,707
–23	3.679	91,522
–22	3.668	88,449
–21	3.658	85,486
–20	3.647	82,627
–19	3.636	79,871
–18	3.624	77,212
–17	3.613	74,648
–16	3.601	72,175
–15	3.588	69,790
–14	3.576	67,490
–13	3.563	65,272
–12	3.550	63,133
–11	3.536	61,070
–10	3.523	59,081
–9	3.509	57,162
–8	3.494	55,311
–7	3.480	53,526
–6	3.465	51,804
–5	3.450	50,143
–4	3.434	48,541
–3	3.418	46,996
–2	3.402	45,505
–1	3.386	44,066
0	3.369	42,679
1	3.352	41,339
2	3.335	40,047
3	3.317	38,800
4	3.299	37,596
5	3.281	36,435
6	3.262	35,313
7	3.243	34,231
8	3.224	33,185
9	3.205	32,176
10	3.185	31,202
11	3.165	30,260
12	3.145	29,351
13	3.124	28,473
14	3.103	27,624
15	3.082	26,804
16	3.060	26,011
17	3.038	25,245
18	3.016	24,505
19	2.994	23,789
20	2.972	23,096
21	2.949	22,427
22	2.926	21,779
23	2.903	21,153
24	2.879	20,547
25	2.856	19,960
26	2.832	19,393
27	2.808	18,843
28	2.784	18,311
29	2.759	17,796
30	2.735	17,297
31	2.710	16,814
32	2.685	16,346
33	2.660	15,892
34	2.634	15,453
35	2.609	15,027
36	2.583	14,614
37	2.558	14,214
38	2.532	13,826
39	2.506	13,449
40	2.480	13,084
41	2.454	12,730
42	2.428	12,387
43	2.402	12,053
44	2.376	11,730
45	2.349	11,416
46	2.323	11,112
47	2.296	10,816
48	2.270	10,529
49	2.244	10,250
50	2.217	9,979
51	2.191	9,717
52	2.165	9,461
53	2.138	9,213
54	2.112	8,973
55	2.086	8,739
56	2.060	8,511
57	2.034	8,291
58	2.008	8,076
59	1.982	7,686
60	1.956	7,665
61	1.930	7,468
62	1.905	7,277
63	1.879	7,091
64	1.854	6,911
65	1.829	6,735
66	1.804	6,564
67	1.779	6,399
68	1.754	6,238
69	1.729	6,081
70	1.705	5,929
71	1.681	5,781
72	1.656	5,637
73	1.632	5,497
74	1.609	5,361
75	1.585	5,229
76	1.562	5,101
77	1.538	4,976
78	1.516	4,855
79	1.493	4,737
80	1.470	4,622
81	1.448	4,511
82	1.426	4,403
83	1.404	4,298
84	1.382	4,196
85	1.361	4,096
86	1.340	4,000
87	1.319	3,906
88	1.298	3,814
89	1.278	3,726
90	1.257	3,640
91	1.237	3,556
92	1.217	3,474
93	1.198	3,395
94	1.179	3,318
95	1.160	3,243
96	1.141	3,170
97	1.122	3,099
98	1.104	3,031
99	1.086	2,964
100	1.068	2,898
101	1.051	2,835
102	1.033	2,773
103	1.016	2,713
104	0.999	2,655
105	0.983	2,597
106	0.966	2,542
107	0.950	2,488
108	0.934	2,436
109	0.918	2,385
110	0.903	2,335
111	0.888	2,286
112	0.873	2,239
113	0.858	2,192
114	0.843	2,147
115	0.829	2,103
116	0.815	2,060
117	0.801	2,018
118	0.787	1,977
119	0.774	1,937
120	0.761	1,898
121	0.748	1,860
122	0.735	1,822
123	0.723	1,786
124	0.710	1,750
125	0.698	1,715
126	0.686	1,680
127	0.674	1,647
128	0.663	1,614
129	0.651	1,582
130	0.640	1,550
131	0.629	1,519
132	0.618	1,489
133	0.608	1,459
134	0.597	1,430
135	0.587	1,401
136	0.577	1,373
137	0.567	1,345
138	0.557	1,318
139	0.548	1,291
140	0.538	1,265
141	0.529	1,240
142	0.520	1,214
143	0.511	1,190
144	0.502	1,165
145	0.494	1,141
146	0.485	1,118
147	0.477	1,095
148	0.469	1,072
149	0.461	1,050
150	0.453	1,029
151	0.445	1,007
152	0.438	986
153	0.430	965
154	0.423	945
155	0.416	925
156	0.408	906
157	0.402	887
158	0.395	868
159	0.388	850
160	0.381	832
161	0.375	815
162	0.369	798
163	0.362	782
164	0.356	765
165	0.350	750
166	0.344	734
167	0.339	719
168	0.333	705
169	0.327	690
170	0.322	677
171	0.317	663
172	0.311	650
173	0.306	638
174	0.301	626
175	0.296	614
176	0.291	602
177	0.286	591
178	0.282	581
179	0.277	570
180	0.272	561
181	0.268	551
182	0.264	542
183	0.259	533
184	0.255	524
185	0.251	516
186	0.247	508
187	0.243	501
188	0.239	494
189	0.235	487
190	0.231	480
191	0.228	473
192	0.224	467
193	0.220	461
194	0.217	456
195	0.213	450
196	0.210	445
197	0.206	439
198	0.203	434
199	0.200	429
200	0.197	424
201	0.194	419
202	0.191	415
203	0.188	410
204	0.185	405
205	0.182	401
206	0.179	396
207	0.176	391
208	0.173	386
209	0.171	382
210	0.168	377
211	0.165	372
212	0.163	367
213	0.160	361
214	0.158	356
215	0.155	350
216	0.153	344
217	0.151	338
218	0.148	332
219	0.146	325
220	0.144	318
221	0.142	311
222	0.140	304
223	0.138	297
224	0.135	289
225	0.133	282

Table 31 — 5K Thermistor Temperature (C) vs Resistance/Voltage

TEMP (C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
–32	3.705	100,260
–31	3.687	94,165
–30	3.668	88,480
–29	3.649	83,170
–28	3.629	78,125
–27	3.608	73,580
–26	3.586	69,250
–25	3.563	65,205
–24	3.539	61,420
–23	3.514	57,875
–22	3.489	54,555
–21	3.462	51,450
–20	3.434	48,536
–19	3.406	45,807
–18	3.376	43,247
–17	3.345	40,845
–16	3.313	38,592
–15	3.281	38,476
–14	3.247	34,489
–13	3.212	32,621
–12	3.177	30,866
–11	3.140	29,216
–10	3.103	27,633
–9	3.065	26,202
–8	3.025	24,827
–7	2.985	23,532
–6	2.945	22,313
–5	2.903	21,163
–4	2.860	20,079
–3	2.817	19,058
–2	2.774	18,094
–1	2.730	17,184
0	2.685	16,325
1	2.639	15,515
2	2.593	14,749
3	2.547	14,026
4	2.500	13,342
5	2.454	12,696
6	2.407	12,085
7	2.360	11,506
8	2.312	10,959
9	2.265	10,441
10	2.217	9,949
11	2.170	9,485
12	2.123	9,044
13	2.076	8,627
14	2.029	8,231
15	1.982	7,855
16	1.935	7,499
17	1.889	7,161
18	1.844	6,840
19	1.799	6,536
20	1.754	6,246
21	1.710	5,971
22	1.666	5,710
23	1.623	5,461
24	1.580	5,225
25	1.538	5,000
26	1.497	4,786
27	1.457	4,583
28	1.417	4,389
29	1.378	4,204
30	1.340	4,028
31	1.302	3,861
32	1.265	3,701
33	1.229	3,549
34	1.194	3,404
35	1.160	3,266
36	1.126	3,134
37	1.093	3,008
38	1.061	2,888
39	1.030	2,773
40	0.999	2,663
41	0.969	2,559
42	0.940	2,459
43	0.912	2,363
44	0.885	2,272
45	0.858	2,184
46	0.832	2,101
47	0.807	2,021
48	0.782	1,944
49	0.758	1,871
50	0.735	1,801
51	0.713	1,734
52	0.691	1,670
53	0.669	1,609
54	0.649	1,550
55	0.629	1,493
56	0.610	1,439
57	0.591	1,387
58	0.573	1,337
59	0.555	1,290
60	0.538	1,244
61	0.522	1,200
62	0.506	1,158
63	0.490	1,118
64	0.475	1,079
65	0.461	1,041
66	0.447	1,006
67	0.433	971
68	0.420	938
69	0.407	906
70	0.395	876
71	0.383	836
72	0.371	805
73	0.360	775
74	0.349	747
75	0.339	719
76	0.329	693
77	0.319	669
78	0.309	645
79	0.300	623
80	0.291	602
81	0.283	583
82	0.274	564
83	0.266	547
84	0.258	531
85	0.251	516
86	0.244	502
87	0.237	489
88	0.230	477
89	0.223	466
90	0.217	456
91	0.211	446
92	0.204	436
93	0.199	427
94	0.193	419
95	0.188	410
96	0.182	402
97	0.177	393
98	0.172	385
99	0.168	376
100	0.163	367
101	0.158	357
102	0.154	346
103	0.150	335
104	0.146	324
105	0.142	312
106	0.138	299
107	0.134	285

Table 32 — 10K Thermistor Temperature (°F) vs Resistance/Voltage Drop

TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
–25	4.758	196,453
–24	4.750	189,692
–23	4.741	183,300
–22	4.733	177,000
–21	4.724	171,079
–20	4.715	165,238
–19	4.705	159,717
–18	4.696	154,344
–17	4.686	149,194
–16	4.676	144,250
–15	4.665	139,443
–14	4.655	134,891
–13	4.644	130,402
–12	4.633	126,183
–11	4.621	122,018
–10	4.609	118,076
–9	4.597	114,236
–8	4.585	110,549
–7	4.572	107,006
–6	4.560	103,558
–5	4.546	100,287
–4	4.533	97,060
–3	4.519	94,020
–2	4.505	91,019
–1	4.490	88,171
0	4.476	85,396
1	4.461	82,729
2	4.445	80,162
3	4.429	77,662
4	4.413	75,286
5	4.397	72,940
6	4.380	70,727
7	4.363	68,542
8	4.346	66,465
9	4.328	64,439
10	4.310	62,491
11	4.292	60,612
12	4.273	58,781
13	4.254	57,039
14	4.235	55,319
15	4.215	53,693
16	4.195	52,086
17	4.174	50,557
18	4.153	49,065
19	4.132	47,627
20	4.111	46,240
21	4.089	44,888
22	4.067	43,598
23	4.044	42,324
24	4.021	41,118
25	3.998	39,926
26	3.975	38,790
27	3.951	37,681
28	3.927	36,610
29	3.903	35,577
30	3.878	34,569
31	3.853	33,606
32	3.828	32,654
33	3.802	31,752
34	3.776	30,860
35	3.750	30,009
36	3.723	29,177
37	3.697	28,373
38	3.670	27,597
39	3.654	26,838
40	3.615	26,113
41	3.587	25,396
42	3.559	24,715
43	3.531	24,042
44	3.503	23,399
45	3.474	22,770
46	3.445	22,161
47	3.416	21,573
48	3.387	20,998
49	3.357	20,447
50	3.328	19,903
51	3.298	19,386
52	3.268	18,874
53	3.238	18,384
54	3.208	17,904
55	3.178	17,441
56	3.147	16,991
57	3.117	16,552
58	3.086	16,131
59	3.056	15,714
60	3.025	15,317
61	2.994	14,925
62	2.963	14,549
63	2.932	14,180
64	2.901	13,824
65	2.870	13,478
66	2.839	13,139
67	2.808	12,814
68	2.777	12,493
69	2.746	12,187
70	2.715	11,884
71	2.684	11,593
72	2.653	11,308
73	2.622	11,031
74	2.592	10,764
75	2.561	10,501
76	2.530	10,249
77	2.500	10,000
78	2.470	9,762
79	2.439	9,526
80	2.409	9,300
81	2.379	9,078
82	2.349	8,862
83	2.319	8,653
84	2.290	8,448
85	2.260	8,251
86	2.231	8,056
87	2.202	7,869
88	2.173	7,685
89	2.144	7,507
90	2.115	7,333
91	2.087	7,165
92	2.059	6,999
93	2.030	6,838
94	2.003	6,683
95	1.975	6,530
96	1.948	6,383
97	1.921	6,238
98	1.894	6,098
99	1.867	5,961
100	1.841	5,827
101	1.815	5,698
102	1.789	5,571
103	1.763	5,449
104	1.738	5,327
105	1.713	5,210
106	1.688	5,095
107	1.663	4,984
108	1.639	4,876
109	1.615	4,769
110	1.591	4,666
111	1.567	4,564
112	1.544	4,467
113	1.521	4,370
114	1.498	4,277
115	1.475	4.185
116	1.453	4,096
117	1.431	4,008
118	1.409	3,923
119	1.387	3,840
120	1.366	3,759
121	1.345	3,681
122	1.324	3,603
123	1.304	3,529
124	1.284	3,455
125	1.264	3,383
126	1.244	3,313
127	1.225	3,244
128	1.206	3,178
129	1.187	3,112
130	1.168	3,049
131	1.150	2,986
132	1.132	2,926
133	1.114	2,866
134	1.096	2,809
135	1.079	2,752
136	1.062	2,697
137	1.045	2,643
138	1.028	2,590
139	1.012	2,539
140	0.996	2,488
141	0.980	2,439
142	0.965	2,391
143	0.949	2,343
144	0.934	2,297
145	0.919	2,253
146	0.905	2,209
147	0.890	2,166
148	0.876	2,124
149	0.862	2,083
150	0.848	2,043
151	0.835	2,003
152	0.821	1,966
153	0.808	1,928
154	0.795	1,891
155	0.782	1,855
156	0.770	1,820
157	0.758	1,786
158	0.745	1,752
159	0.733	1,719
160	0.722	1,687
161	0.710	1,656
162	0.699	1,625
163	0.687	1,594
164	0.676	1,565
165	0.666	1,536
166	0.655	1,508
167	0.645	1,480
168	0.634	1,453
169	0.624	1,426
170	0.614	1,400
171	0.604	1,375
172	0.595	1,350
173	0.585	1,326
174	0.576	1,302
175	0.567	1,278
176	0.558	1,255
177	0.549	1,233
178	0.540	1,211
179	0.532	1,190
180	0.523	1,169
181	0.515	1,148
182	0.507	1,128
183	0.499	1,108
184	0.491	1,089
185	0.483	1,070
186	0.476	1,052
187	0.468	1,033
188	0.461	1,016
189	0.454	998
190	0.447	981
191	0.440	964
192	0.433	947
193	0.426	931
194	0.419	915
195	0.413	900
196	0.407	885
197	0.400	870
198	0.394	855
199	0.388	841
200	0.382	827
201	0.376	814
202	0.370	800
203	0.365	787
204	0.359	774
205	0.354	762
206	0.349	749
207	0.343	737
208	0.338	725
209	0.333	714
210	0.328	702
211	0.323	691
212	0.318	680
213	0.314	670
214	0.309	659
215	0.305	649
216	0.300	639
217	0.296	629
218	0.292	620
219	0.288	610
220	0.284	601
221	0.279	592
222	0.275	583
223	0.272	574
224	0.268	566
225	0.264	557

Table 33 — 10K Thermistor Temperatures (°C) vs Resistance/Voltage Drop

TEMP (C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
–32	4.762	200,510	**15**	3.056	15,714	**62**	0.940	2,315
–31	4.748	188,340	**16**	3.000	15,000	**63**	0.913	2,235
–30	4.733	177,000	**17**	2.944	14,323	**64**	0.887	2,157
–29	4.716	166,342	**18**	2.889	13,681	**65**	0.862	2,083
–28	4.700	156,404	**19**	2.833	13,071	**66**	0.837	2,011
–27	4.682	147,134	**20**	2.777	12,493	**67**	0.813	1,943
–26	4.663	138,482	**21**	2.721	11,942	**68**	0.790	1,876
–25	4.644	130,402	**22**	2.666	11,418	**69**	0.767	1,813
–24	4.624	122,807	**23**	2.610	10,921	**70**	0.745	1,752
–23	4.602	115,710	**24**	2.555	10,449	**71**	0.724	1,693
–22	4.580	109,075	**25**	2.500	10,000	**72**	0.703	1,637
–21	4.557	102,868	**26**	2.445	9,571	**73**	0.683	1,582
–20	4.533	97,060	**27**	2.391	9,164	**74**	0.663	1,530
–19	4.508	91,588	**28**	2.337	8,776	**75**	0.645	1,480
–18	4.482	86,463	**29**	2.284	8,407	**76**	0.626	1,431
–17	4.455	81,662	**30**	2.231	8,056	**77**	0.608	1,385
–16	4.426	77,162	**31**	2.178	7,720	**78**	0.591	1,340
–15	4.397	72,940	**32**	2.127	7,401	**79**	0.574	1,297
–14	4.367	68,957	**33**	2.075	7,096	**80**	0.558	1,255
–13	4.335	65,219	**34**	2.025	6,806	**81**	0.542	1,215
–12	4.303	61,711	**35**	1.975	6,530	**82**	0.527	1,177
–11	4.269	58,415	**36**	1.926	6,266	**83**	0.512	1,140
–10	4.235	55,319	**37**	1.878	6,014	**84**	0.497	1,104
–9	4.199	52,392	**38**	1.830	5,774	**85**	0.483	1,070
–8	4.162	49,640	**39**	1.784	5,546	**86**	0.470	1,037
–7	4.124	47,052	**40**	1.738	5,327	**87**	0.457	1,005
–6	4.085	44,617	**41**	1.692	5,117	**88**	0.444	974
–5	4.044	42,324	**42**	1.648	4,918	**89**	0.431	944
–4	4.003	40,153	**43**	1.605	4,727	**90**	0.419	915
–3	3.961	38,109	**44**	1.562	4,544	**91**	0.408	889
–2	3.917	36,182	**45**	1.521	4,370	**92**	0.396	861
–1	3.873	34,367	**46**	1.480	4,203	**93**	0.386	836
0	3.828	32,654	**47**	1.439	4,042	**94**	0.375	811
1	3.781	31,030	**48**	1.400	3,889	**95**	0.365	787
2	3.734	29,498	**49**	1.362	3,743	**96**	0.355	764
3	3.686	28,052	**50**	1.324	3,603	**97**	0.345	742
4	3.637	26,686	**51**	1.288	3,469	**98**	0.336	721
5	3.587	25,396	**52**	1.252	3,340	**99**	0.327	700
6	3,537	24,171	**53**	1.217	3,217	**100**	0.318	680
7	3.485	23,013	**54**	1.183	3,099	**101**	0.310	661
8	3.433	21,918	**55**	1.150	2,986	**102**	0.302	643
9	3.381	20,883	**56**	1.117	2,878	**103**	0.294	626
10	3.328	19,903	**57**	1.086	2,774	**104**	0.287	609
11	3.274	18,972	**58**	1.055	2,675	**105**	0.279	592
12	3.220	18,090	**59**	1.025	2,579	**106**	0.272	576
13	3.165	17,255	**60**	0.996	2,488	**107**	0.265	561
14	3.111	16,474	**61**	0.968	2,400			

Table 34 — Suction Pressure Transducer Pressure (PSIG) vs Voltage Drop

PRESSURE (PSIG)	VOLTAGE DROP (V)	PRESSURE (PSIG)	VOLTAGE DROP (V)	PRESSURE (PSIG)	VOLTAGE DROP (V)	PRESSURE (PSIG)	VOLTAGE DROP (V)
0	0.290	**34**	1.436	**68**	2.582	**102**	3.728
1	0.324	**35**	1.470	**69**	2.615	**103**	3.761
2	0.357	**36**	1.503	**70**	2.649	**104**	3.795
3	0.391	**37**	1.537	**71**	2.683	**105**	3.829
4	0.425	**38**	1.571	**72**	2.717	**106**	3.862
5	0.458	**39**	1.604	**73**	2.750	**107**	3.896
6	0.492	**40**	1.638	**74**	2.784	**108**	3.930
7	0.526	**41**	1.672	**75**	2.818	**109**	3.964
8	0.560	**42**	1.705	**76**	2.851	**110**	3.997
9	0.593	**43**	1.739	**77**	2.885	**111**	4.031
10	0.627	**44**	1.773	**78**	2.919	**112**	4.065
11	0.661	**45**	1.807	**79**	2.952	**113**	4.098
12	0.694	**46**	1.840	**80**	2.986	**114**	4.132
13	0.728	**47**	1.874	**81**	3.020	**115**	4.166
14	0.762	**48**	1.908	**82**	3.054	**116**	4.200
15	0.795	**49**	1.941	**83**	3.087	**117**	4.233
16	0.829	**50**	1.975	**84**	3.121	**118**	4.267
17	0.863	**51**	2.009	**85**	3.155	**119**	4.301
18	0.897	**52**	2.042	**86**	3.188	**120**	4.334
19	0.930	**53**	2.076	**87**	3.222	**121**	4.368
20	0.964	**54**	2.110	**88**	3.256	**122**	4.402
21	0.998	**55**	2.144	**89**	3.290	**123**	4.435
22	1.031	**56**	2.177	**90**	3.323	**124**	4.469
23	1.065	**57**	2.211	**91**	3.357	**125**	4.503
24	1.099	**58**	2.245	**92**	3.391	**126**	4.537
25	1.132	**59**	2.278	**93**	3.424	**127**	4.570
26	1.166	**60**	2.312	**94**	3.458	**128**	4.604
27	1.200	**61**	2.346	**95**	3.492	**129**	4.638
28	1.234	**62**	2.380	**96**	3.525	**130**	4.671
29	1.267	**63**	2.413	**97**	3.559	**131**	4.705
30	1.301	**64**	2.447	**98**	3.593	**132**	4.739
31	1.335	**65**	2.481	**99**	3.627	**133**	4.772
32	1.368	**66**	2.514	**100**	3.660	**134**	4.806
33	1.402	**67**	2.548	**101**	3.694	**135**	4.840

APPENDIX A — CCN TABLES

UNIT (General Unit Configurations)

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
Number of Compressors	1 – 3	2: 12.5, 25 ton 3: 15, 18, 20 ton		NUM_COMP
Compressor Min On Time	120 – 999	180	sec	MIN_ON
Compressor Min Off Time	300 – 999	300	sec	MIN_OFF
Runtime to Reset Strikes	120 – 999	300	sec	MIN_ON_S
Cool Stage Decrease Rate	120 – 999	300	sec	STAGEDEC
Cool Stage Increase Rate	120 – 999	450	sec	STAGEINC
Fan-off Delay, Mech Cool	0 – 600	60	sec	COOL_FOD
Invert Evaporators	Yes/No	Yes		INVERT_E
Alert Each Strike	Yes/No	Yes		ALM_NOW
Suction OK Temperature	10 – 50	18	dF	SSTOK
Low Suction — Level 1	10 – 50	20	dF	SSTLEV1
Low Suction — Level 2	5 – 50	15	dF	SSTLEV2
Low Suction — Level 3	0 – 50	10	dF	SSTLEV3
Type of Heat Installed	0 = No Heat 1 = Gas 2 = Electric	1: 48 Series 2: 50 Series with electric heat 0: 50 Series with no electric heat		HEATTYPE
Heat Minimum On Time	60 – 999	120	sec	HMIN_ON
Heat Minimum Off Time	60 – 999	120	sec	HMIN_OFF
Heat Stage Decrease Rate	120 – 999	300	sec	HSTAGDEC
Heat Stage Increase Rate	120 – 999	450	sec	HSTAGINC
Fan-off Delay, Elec Heat	10 – 600	30	sec	ELEC_FOD
Fan-off Delay, Gas Heat	45 – 600	45	sec	GAS_FOD
SAT Cool Demand (+) Level	0.5 – 10.0	1.0	^F	SAT_POS
SAT Cool Demand (–) Level	-10.0 – -0.5	-1.0	^F	SAT_NEG
SAT Settling Time	10 – 900	240	sec	SAT_SET
Minimum SAT Upper Level	35.0 – 65.0	58.0	dF	SATMIN_H
Minimum SAT Lower Level	35.0 – 65.0	48.0	dF	SATMIN_L
A1 Current Sensing	Enable/Disable	Enable		A1_SENSE
Circuit A Evaporator Pos	1 – 3	1		CIR_A_P
Circuit A Level 1 Fans	1 – 7	1		CIR_A_1
A Fan Lev1 ON Pressure	0 – 500.0	150.0	PSIG	ALEV1ON
A Fan Lev1 OFF Pressure	0 – 500.0	0.0	PSIG	ALEV1OFF
Circuit A Level 2 Fans	1 – 7	3		CIR_A_2
A Fan Lev2 ON Pressure	0 – 500.0	200.0	PSIG	ALEV2ON
A Fan Lev2 OFF Pressure	0 – 500.0	100.0	PSIG	ALEV2OFF
B1 Current Sensing	Enable/Disable	Enable		B1_SENSE
Circuit B Evaporator Pos	1 – 3	2		CIR_B_P
Circuit B Level 1 Fans	1 – 7	4		CIR_B_1
B Fan Lev1 ON Pressure	0 – 500.0	150.0	PSIG	BLEV1ON
B Fan Lev1 OFF Pressure	0 – 500.0	0.0	PSIG	BLEV1OFF
Circuit B Level 2 Fans	1 – 7	6		CIR_B_2
B Fan Lev2 ON Pressure	0 – 500.0	200.0	PSIG	BLEV2ON
B Fan Lev2 OFF Pressure	0 – 500.0	100.0	PSIG	BLEV2OFF
C1 Current Sensing	Enable/Disable	Enable		C1_SENSE
Circuit C Evaporator Pos	1 – 3	3		CIR_C_P
Circuit C Level 1 Fans	1 – 7	5		CIR_C_1
C Fan Lev1 ON Pressure	0 – 500.0	150.0	PSIG	CLEV1ON
C Fan Lev1 OFF Pressure	0 – 500.0	0.0	PSIG	CLEV1OFF
Circuit C Level 2 Fans	1 – 7	7		CIR_C_2
C Fan Lev2 ON Pressure	0 – 500.0	200.0	PSIG	CLEV2ON
C Fan Lev2 OFF Pressure	0 – 500.0	100.0	PSIG	CLEV2OFF

APPENDIX A — CCN TABLES (cont)

OPTIONS1 (Option Configurations)

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
Startup Delay (seconds)	0 – 600	30	sec	STARTDLY
Unit Control Type	1 = AutoSelect 2 = Thermostat 3 = Space Sensor	1		CTL_TYPE
Thermostat Control Type	0 = Adaptive 1 = 1 Stage Y1 2 = 2 Stage Y1	0		STATTYPE
Fan On When Occupied	Yes/No	Yes		OCC_FAN
Shut Down on IDF Failure	Yes/No	Yes		FATALFAN
Economizer Equipped Unit	Yes/No	Yes		ECONO
Fan Status Input	0 = Not Installed 1 = Normally Open 2 = Normally Closed	0		FANSTCFG
Filter Status Input	0 = Not Installed 1 = Normally Open 2 = Normally Closed	0: No FIOP 1: FIOP		FILSTCFG
Fire Shutdown Input	0 = Not Installed 1 = Normally Open 2 = Normally Closed	0: No FIOP 2: FIOP		SHTDNCFG

IAQ (Indoor Air Quality Configurations)

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
Minimum IAQ Position	0 – 30	10	%	IAQMINP
Economizer Min Position	0 – 100	30	%	ECONOMIN
AQ Differential Low	0 – 1000	100		DAQ_LOW
AQ Differential High	100 – 2000	700		DAQ_HIGH
IAQ Sensor Value at 4mA	0 – 5000	0		IAQ_4MA
IAQ Sensor Value at 20mA	0 – 5000	2000		IAQ_20MA
OAQ Sensor Value at 4mA	0 – 5000	0		OAQ_4MA
OAQ Sensor Value at 20mA	0 – 5000	2000		OAQ_20MA
OAQ Lockout Value		600		OAQLOCK

ECONOCFG (Economizer Configurations)

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
Economizer Equipped Unit	Yes/No	No: No FIOP Yes: FIOP		ECONO
Economizer Min Position	0 – 100	30	%	ECONOMIN
Econ High Temp Lockout	55 – 75	65	dF	OATLECLH
Econ Low Temp Lockout	0 – 50	30	dF	OATLECLL
Unoccupied Free Cooling	Enable/Disable			FC_ENABL
Power Exhaust Control	Enable/Disable	Disable : NO FIOP Enable: FIOP		PE_ENABL
PE Stage1 Econo Position	0 – 100	25	%	PE1_POS
PE Stage2 Econo Position	0 – 100	75	%	PE2_POS
Enthalpy Switch Input	0 = Not Installed 1 = Normally Open 2 = Normally Closed	0		ENTHLCFG
HumidiStat Input	0 = Not Installed 1 = Normally Open 2 = Normally Closed	0		HUMSTCFG
Economizer Travel Time	5 – 300	150	sec	ECONOTRV
Bottom Stage Max Econmzr	0 – 100	50	%	ECONMAXB
Middle Stage Max Econmzr	0 – 100	25	%	ECONMAXM
Top Stage Max Econmzr	0 – 100	0	%	ECONMAXT
Economizer PID Deadband	0 – 25	3	%	ECONBAND
Economizer PID – kP	0.0 – 99.9	2.5		ECONO_P
Economizer PID – kI	0.0 – 99.9	.12		ECONO_I
Economizer PID – kD	0.0 – 99.9	1		ECONO_D
Economizer PID – rate	0.0 – 99.9	15.0	sec	ECONO_DT

SET POINT

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
Occupied Cool Set point	55 – 80	78	dF	OCSP
Occupied Heat Set point	55 – 80	68	dF	OHSP
Unoccupied Cool Set point	75 – 95	85	dF	UCSP
Unoccupied Heat Set point	40 – 80	60	dF	HCSP
Heat-Cool Set point Gap	2 – 10	5	^F	HCSP_GAP
Heating Lockout Temp	55 – 90	75	dF	OATLHEAT
Compressor Lockout Temp	0 – 75	0	dF	OATLCOMP
Econ High Temp Lockout	40 – 75	65	dF	OATLECLH
Econ Low Temp Lockout	0 – 50	0	dF	OATLECLL
Minimum SAT Upper Level	35 – 65	58	dF	SATMIN_H
Minimum SAT Lower Level	35 – 65	48	dF	SATMIN_L
Low Cool SAT Set point	55 – 75	65	dF	LCSASP
High Cool SAT Set point	50 – 70	55	dF	HCSASP

APPENDIX A — CCN TABLES (cont)

GENERAL

DESCRIPTION	STATUS	UNITS	POINT	FORCEABLE
UNIT:				
Currently Occupied	Yes/No		OCCUPIED	Y
Supply Air Temperature	snnn.n	dF	SAT	N
Outdoor Air Temperature	snnn.n	dF	OAT	Y
Space Temperature	snnn.n	dF	SPT	Y
Space Temperature Offset	sn.n	dF	SPTO	Y
Cooling Demand	snn.n	^F	COOL_DMD	N
Heating Demand	snn.n	^F	HEAT_DMD	N
Unit Shutdown Input	On/Off		FIREDOWN	Y
Fan Status	On/Off		FAN_STAT	N
Filter Status	Dirty/Clean		FILTSTAT	N
Indoor Fan	On/Off		IDF	N
Indoor Fan Feedback	On/Off		IDF_FDBK	N
Indoor Fan Power	On/Off		IDFPWR	N
Outdoor Fan Contactor 1	On/Off		OFC_1	N
Outdoor Fan Contactor 2	On/Off		OFC_2	N
Outdoor Fan Contactor 3	On/Off		OFC_3	N
Heat Stage 1	On/Off		HEAT_1	N
Heat 1 Timeguard (secs)	Nnn		TIMGD_H1	N
Heat Stage 2	On/Off		HEAT_2	N
Heat 2 Timeguard (secs)	nnn		TIMGD_H2	N
CIRCUIT A:				
Saturated Suct Temp A	snnn.n	dF	SST_A	N
Saturated Suct Press A	nnn.n	PSIG	SSP_A	N
Saturated Cond Temp A	snnn.n	dF	SCT_A	N
Saturated Cond Press A	0.0	PSIG	SCP_A	N
Compressor A1	On/Off		COMP_A1	N
A1 Current Sensor	On/Off		CS_A1	N
A1 Timeguard (secs)	nnn		TIMGD_A1	N
Circuit A Fan Level	n		A_FANLEV	N
CIRCUIT B:				
Saturated Suct Temp B	snnn.n	dF	SST_B	N
Saturated Suct Press B	nnn.n	PSIG	SSP_B	N
Saturated Cond Temp B	snnn.n	dF	SCT_B	N
Saturated Cond Press B	0.0	PSIG	SCP_B	N
Compressor B1	On/Off		COMP_B1	N
B1 Current Sensor	On/Off		CS_B1	N
B1 Timeguard (secs)	nnn		TIMGD_B1	N
Circuit B Fan Level	n		B_FANLEV	N
CIRCUIT C:				
Saturated Suct Temp C	snnn.n	dF	SST_C	N
Saturated Suct Press C	nnn.n	PSIG	SSP_C	N
Saturated Cond Temp C	snnn.n	dF	SCT_C	N
Saturated Cond Press C	0.0	PSIG	SCP_C	N
Compressor C1	On/Off		COMP_C1	N
C1 Current Sensor	On/Off		CS_C1	N
C1 Timeguard (secs)	nnn		TIMGD_C1	N
Circuit C Fan Level	n		C_FANLEV	N

APPENDIX A — CCN TABLES (cont)

TSTAT (Thermostat)

DESCRIPTION	STATUS	UNITS	POINT	FORCEABLE
Thermostat Y1 Input	On/Off		Y1	Y
Thermostat Y2 Input	On/Off		Y2	Y
Thermostat W1 Input	On/Off		W1	Y
Thermostat W2 Input	On/Off		W2	Y
Thermostat G Input	On/Off		G	Y

ECONOMZR (Economizer)

DESCRIPTION	STATUS	UNITS	POINT	FORCEABLE
Economizer Equipped Unit	Yes/No		ECONO	N
Economizer Power	On/Off		ECON_PWR	N
Economizer Commanded Pos	nn	%	ECONOCMD	N
Economizer Position	nn	%	ECONOPOS	N
Minimum Position in Effect	Nnn	%	MIN_POS	N
Supply Air Temperature	snnn.n	dF	SAT	N
Supply Air Temp Demand	snn.n	^F	SAT_DMD	N
Enthalpy Switch Input	High/Low		ENTHALPY	Y
Humidistat Input	On/Off		HUM_STAT	Y
Indoor Air Quality	nnnn		IAQ	Y
Outdoor Air Quality	nnnn		OAQ	Y
Power Exhaust Relay 1	On/Off		PE_1	N
Power Exhaust Relay 2	On/Off		PE_2	N

APPENDIX A — CCN TABLES (cont)

COOLING

DESCRIPTION	STATUS	UNITS	POINT	FORCEABLE
Outdoor Air is Cool	Yes/No		OAT_COOL	N
OK to Use Compressors	Yes/No		MECHCOOL	N
Available Cooling Stages	n		AVLCSTGS	N
Requested Cooling Stages	n		REQCSTGS	N
Actual Cooling Stages	n		ACTCSTGS	N
Compressor A1	On/Off		COMP_A1	N
Compressor B1	On/Off		COMP_B1	N
Compressor C1	On/Off		COMP_C1	N
Space Temperature	snnn.n	dF	SPT	Y
Cooling Demand	snn.n	^F	COOL_DMD	N
Cool Demand d/dt (F/min)	sn.n		CLDTREND	N
Supply Air Temperature	snnn.n	dF	SAT	N
Supply Air d/dt (F/min)	sn.n		SATTREND	N
SAT Delta Reference Temp	snnn.n	dF	SAT_REF	N
Economizer Position	nnn	%	ECONOPOS	N
Cool Thermal Lag Factor	n.n		COOL_LAG	Y
SPT Cool Demand(+) Level	n.n	^F	DEM_POS	Y
SPT Cool Demand(-) Level	sn.n	^F	DEM_NEG	Y
SAT Cool Demand(+) Level	n.n	^F	SAT_POS	Y
SAT Cool Demand(-) Level	sn.n	^F	SAT_NEG	Y
MET2Add SAT Trend Level	sn.n	^F	M2ADC.T	Y

HEATING

DESCRIPTION	STATUS	UNITS	POINT	FORCEABLE
OK to Use Heat	Yes/No		OKTOHEAT	N
Available Heating Stages	n		AVLHSTGS	N
Requested Heating Stages	n		REQHSTGS	N
Actual Heating Stages	n		ACTHSTGS	N
Heat Stage 1	On/Off		HEAT_1	N
Heat Stage 2	On/Off		HEAT_2	N
Space Temperature	snnn.n	dF	SPT	Y
Heating Demand	snn.n	^F	HEAT_DMD	N
Heat Demand d/dt (F/min)	snn.n		HTDTREND	N
Supply Air Temperature	snnn.n	dF	SAT	N
Supply Air d/dt (F/min)	snn.n		SATTREND	N
Heat Thermal Lag Factor	n.n		HEAT_LAG	Y
SPT Heat Demand (+) Level	n.n	^F	HDEM_POS	Y
SPT Heat Demand (-) Level	sn.n	^F	HDEM_NEG	Y

STATUS (Status of Modes)

SYSTEM MODE:	
	Level 1 Description
	Level 2 Description
	Level 3 Description
HVAC MODE:	
	Level 1 Description
	Level 2 Description
	Level 3 Description

APPENDIX A — CCN TABLES (cont)

ALARMOUT

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
ALARM OUTPUT ACTIVE FOR:				
Space Sensor Failure	Yes/No			SPT_AL
SAT Thermistor Failure	Yes/No			SAT_AL
OAT Thermistor Failure	Yes/No			OAT_AL
Current Sensor Failure	Yes/No			CS_AL
Compressor Failure	Yes/No			COMP_AL
Refrig Circuit Failure	Yes/No			CKT_AL
Thermostat Failure	Yes/No			TSTAT_AL
SSP Transducer Failure	Yes/No			SSP_AL
SCT Thermistor Failure	Yes/No			SCT_AL
Indoor Fan Failure	Yes/No			FAN_AL
Plugged Filter	Yes/No			FILT_AL

STRTHOUR (Component Hours and Cycles)

DESCRIPTION	STATUS	UNITS	POINT
Compressor A1 Run Hours	nnnnn.nn	hours	HR_A1
Compressor B1 Run Hours	nnnnn.nn	hours	HR_B1
Compressor C1 Run Hours	nnnnn.nn	hours	HR_C1
Compressor A1 Cycles	nnnnnn		CY_A1
Compressor B1 Cycles	nnnnnn		CY_B1
Compressor C1 Cycles	nnnnnn		CY_C1
Indoor Fan Run Hours	nnnnn.nn	hours	HR_IDF
Indoor Fan Cycles	nnnnnn		CY_IDF
OD Fan Cont. 1 Run Hours	nnnnn.nn	hours	HR_OFC_1
OD Fan Cont. 2 Run Hours	nnnnn.nn	hours	HR_OFC_2
OD Fan Cont. 3 Run Hours	nnnnn.nn	hours	HR_OFC_3
OD Fan Contact. 1 Cycles	nnnnnn		CY_OFC_1
OD Fan Contact. 2 Cycles	nnnnnn		CY_OFC_2
OD Fan Contact. 3 Cycles	nnnnnn		CY_OFC_3
Heat Stage 1 Run Hours	nnnnn.nn	hours	HR_HTR_1
Heat Stage 2 Run Hours	nnnnn.nn	hours	HR_HTR_2
Heat Stage 1 Cycles	nnnnnn		CY_HTR_1
Heat Stage 2 Cycles	nnnnnn		CY_HTR_2
Power Exhaust1 Run Hours	nnnnn.nn	hours	HR_PE_1
Power Exhaust2 Run Hours	nnnnn.nn	hours	HR_PE_2
Power Exhaust 1 Cycles	nnnnnn		CY_PE_1
Power Exhaust 2 Cycles	nnnnnn		CY_PE_2
Economizer Pwr Run Hours	nnnnn.nn	hours	HR_ECPWR
Economizer Power Cycles	nnnnnn		CY_ECPWR
Alarm Output Run Hours	nnnnn.nn	hours	HR_ALM
Alarm Output Cycles	nnnnnn		CY_ALM

VERSIONS

DESCRIPTION	VERSION NUMBER	STATUS
MBB	CESR131278-	nn-nn
ECB	CESR131249-	nn-nn
MARQUEE	CESR131171-	nn-nn

APPENDIX A — CCN TABLES (cont)

BRODEFS (Broadcast POC Definition Table)

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
CCN Time/Date Broadcast	Yes/No	No		CCNBC
CCN OAT Broadcast	Yes/No	No		OATBC
Global Schedule Broadcast	Yes/No	No		GSBC
CCN Broadcast Acker	Yes/No	No		CCNBCACK
Daylight Savings Start				
Month	1 to 12	4		STARTM
Week	1 to 5	1		STARTW
Day	1 to 7	7		STARTD
Minutes to add	0 to 60	60	min	MINADD
Daylight Savings Stop				
Month	1 to 12	10		STOPM
Week	1 to 5	5		STOPW
Day	1 to 7	7		STOPD
Minutes to subtract	0 to 60	60	min	MINSUB

OCCUPANCY MAINTENANCE TABLE

OCCUPANCY SUPERVISORY

DESCRIPTION	STATUS	POINT
Current Mode (1=Occup.)	0,1	MODE
Current Occup. Period #	0-8	PER-NO
Timed-Override in Effect	Yes/No	OVERLAST
Time-Override Duration	0-4 hours	OVR_HRS
Current Occupied Time	hh:mm	STRTTIME
Current Unoccupied Time	hh:mm	ENDTIME
Next Occupied Day		NXTOCDAY
Next Occupied Time	hh:mm	NXTOCTIM
Next Unoccupied Day		NXTUNDAY
Next Unoccupied Time	hh:mm	NXTUNTIM
Previous Unoccupied Day		PRVUNDAY
Previous Unoccupied Time	hh:mm	PRVUNTIM

DISPLAY (STDU SETUP)

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
Service Password	nnnn	1111		PASSWORD
Password Enable	Enable/Disable	Enable		PASS_EBL
Metric Display	Off/On	Off		DISPUNIT
Language Selection	0 = ENGLISH 1 = FRANCAIS 2 = ESPANOL 3 = PORTUGUES	0		LANGUAGE

SCHEDOVR (TIMED OVERRIDE SETUP)

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
Schedule Number	0-99	0		SCHEDNUM
Override Time Limit	0-4	4	hours	OTL
Timed Override Hours	0-4	0	hours	OTL_EXT
Timed Override	Yes/No	Yes		TIMEOVER

ALARMDEF (Alarm Definition Table)

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
Alarm Routing Control	00000000	00000000		ALRM_CNT
Equipment Priority	0 to 7	4		EQP_TYPE
Comm Failure Retry Time	1 to 240	10	min	RETRY_TM
Re-alarm Time	1 to 255	30	min	RE-ALARM
Alarm System Name	XXXXXXXX	48/50HG		ALRM_NAM

ALARMS

DESCRIPTION	STATUS	UNITS	POINT
Reset All Current Alarms	No		ALRESET
Reset Alarm History	No		ALHISCLR
Active Alarm #1	Axxx or Txxx		ALARM01C
Active Alarm #2	Axxx or Txxx		ALARM02C
Active Alarm #3	Axxx or Txxx		ALARM03C
Active Alarm #4	Axxx or Txxx		ALARM04C
Active Alarm #5	Axxx or Txxx		ALARM05C
Active Alarm #6	Axxx or Txxx		ALARM06C
Active Alarm #7	Axxx or Txxx		ALARM07C
Active Alarm #8	Axxx or Txxx		ALARM08C
Active Alarm #9	Axxx or Txxx		ALARM09C
Active Alarm #10	Axxx or Txxx		ALARM10C
Active Alarm #11	Axxx or Txxx		ALARM11C
Active Alarm #12	Axxx or Txxx		ALARM12C
Active Alarm #13	Axxx or Txxx		ALARM13C
Active Alarm #14	Axxx or Txxx		ALARM14C
Active Alarm #15	Axxx or Txxx		ALARM15C
Active Alarm #16	Axxx or Txxx		ALARM16C
Active Alarm #17	Axxx or Txxx		ALARM17C
Active Alarm #18	Axxx or Txxx		ALARM18C
Active Alarm #19	Axxx or Txxx		ALARM19C
Active Alarm #20	Axxx or Txxx		ALARM20C
Active Alarm #21	Axxx or Txxx		ALARM21C
Active Alarm #22	Axxx or Txxx		ALARM22C
Active Alarm #23	Axxx or Txxx		ALARM23C
Active Alarm #24	Axxx or Txxx		ALARM24C
Active Alarm #25	Axxx or Txxx		ALARM25C

NOTE: Alerts will displayed as Txxx.

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CONTROL SET-UP CHECKLIST

Model Number: _____
Serial Number: _____
Date: _____
Technician: _____

Software Versions: _____
MBB: CESR131278-00- __ __
SCB/ECB: CESR131249-00- __ __
MARQ: CESR131171-01- __ __

INDICATE UNIT SETTINGS BELOW

Control Type: Thermostat / T55 Space Temp. / T56 Space Temp.
Set Points: Cooling Occupied:_____ Unoccupied:_____
Heating Occupied:_____ Unoccupied:_____

Configurations		SETTING	Default		
UNIT					
	U.CTL	_____	Auto	Thermostat	Space Sensor
	T.CTL	_____	Adaptive	1 Stage Y1	2 Stage Y1
	OC.FN	_____	Y	N	
	IDF.F	_____	N	Y	
	FN.SW	_____	No Switch	Normal Open	Normal Close
	FL.SW	_____	No Switch	Normal Open	Normal Close
	FS.SW	_____	No Switch	Normal Open	Normal Close
	ECB	_____	Y	N	
	SAT.T	_____	240		
COOL					
	MC.LO	_____	40 F		
	MRT.C	_____	180 sec		
	MOT.C	_____	300 sec		
	CL.PD	_____	1.0 ΔF		
	CL.ND	_____	–1.0 ΔF		
	C.LAG	_____	1.0 min		
	SA.PD	_____	1.0 ΔF		
	SA.ND	_____	–1.0 ΔF		
	C.INC	_____	450 sec		
	C.DEC	_____	300 sec		
	A.NOW	_____	Y	N	
	INV.E	_____	Y	N	
	A1.CS	_____	Y	N	
	B1.CS	_____	Y	N	
	C1.CS	_____	Y	N	
HEAT					
	HT.TY	_____	No Heat	GAS	ELECTRIC
	HT.LO	_____	75 F		
	MRT.H	_____	120 sec		
	MOT.H	_____	360 sec		
	HT.PD	_____	1.0 ΔF		
	HT.ND	_____	–1.0 ΔF		
	H.LAG	_____	1.0 min		
	H.INC	_____	450 sec		
	H.DEC	_____	300 sec		
ECON					
	EC.EQ	_____	Y	N	
	MIN.P	_____	30 %		
	ECL.H	_____	65 F		
	ECL.L	_____	0 F		

	FC.EN	_____	Y		
	EN.SW	_____	No Switch	Normal Open	Normal Close
	PE.EN	_____	N	Y	
	PE1.P	_____	25 %		
	PE2.P	_____	75 %		
IAQ					
	AQ.MP	_____	10 %		
	MIN.P	_____	30 %		
	AQD.L	_____	100 PPM		
	AQD.H	_____	700 PPM		
	PURG	_____	Disabled	Enabled	
	I.4M	_____	0 PPM		
	I.20M	_____	2000 PPM		
	O.4M	_____	0 PPM		
	O.20M	_____	2000 PPM		
	OAQ.L	_____	600 PPM		
CCN					
	CCN.A	_____	1		
	CCN.B	_____	0		
	BAUD	_____	3		
DISP					
	METR	_____	N	Y	
	LANG	_____	0		
	PROT	_____	Disabled	Enabled	
	PSWD	_____	1111		

Time/Date Set	Y	N	
Occupancy Schedule Number	0	1-64	65-99
Occupancy Schedules Set	Y	N	
Correct Compressor Rotation Verified	Y	N	
Installation Checklist Completed	Y	N	

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

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